Science & Mechanics

*Complete*

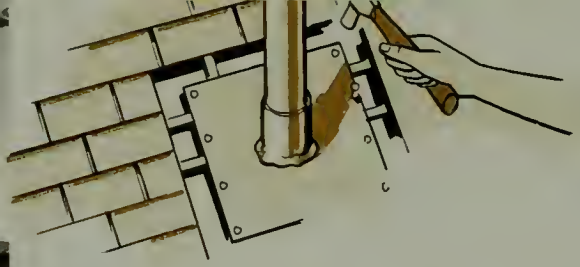
# HANDYMAN ENCYCLOPEDIA

DO-IT-YOURSELF

3

BOAT HANDLING
CANOE

# Complete Handyman do-it-yourself Encyclopedia



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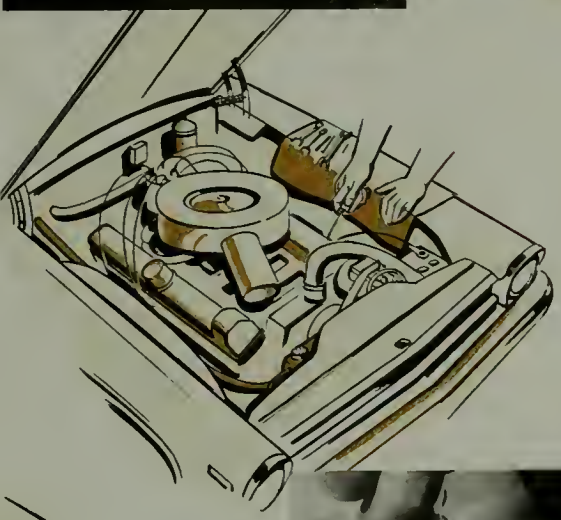

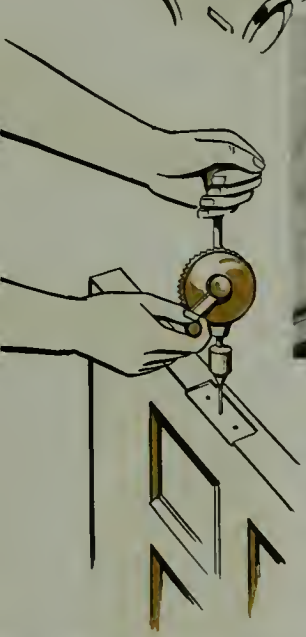

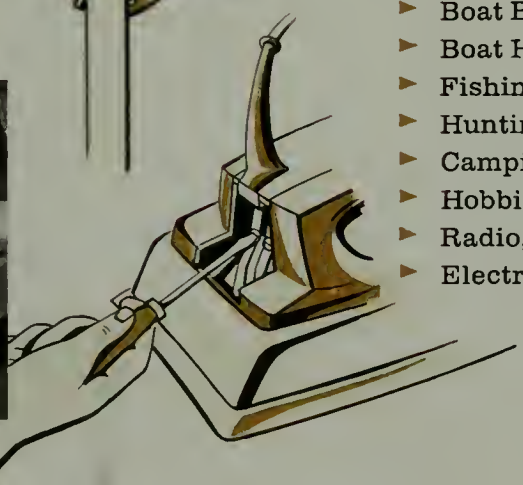

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# Complete Handyman yourself Encyclopedia

A COMPILATION OF NEW AND PREVIOUSLY PUBLISHED SPECIAL INTEREST PROJECTS AND MANUALS FOR THE REPAIR AND CARE OF HOMES, AUTO, APPLIANCES, HOBBY EQUIPMENT.

*by the editors of*

**Science & Mechanics**

3

BOAT HANDLING
CANOE

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# How to Handle a Bigger Boat

**Getting used to the feel of a big boat takes practice, but these tips will help you make the transition**

A SIGNIFICANT MOMENT in any yachtsman's career is when he graduates from a small runabout suitable for short trips to a larger craft with sleeping accommodations, a galley, and sufficient cruising range to remain away from home for days on end.

When this day comes to you, don't forget that you have entered into a new class of boating with its own techniques. Although the essentials of good boating are the same whatever the size of your vessel, you will doubtless have to develop some new skills. It can be scary; you may feel you're about to ram the dock with the Queen Mary.

Perhaps the first thing that will strike you is the difference between the handling characteristics of the runabout and the larger boat. Runabouts and most outboards are constructed as lightly as possible, consistent with the strength required for the intended service. Since a larger boat has greater displacement, the designer can afford to increase scantlings and add equipment, thereby increasing the weight.

*The "big boat feel."* This difference in handling, "big boat feel," actually is a feeling of solidity, of inertia, of mass. The larger boat will have steering characteristics with this inertial feeling, and it is one that takes some getting used to.

A good first step for familiarization is to go on an extended trial run with the former owner, or the dealer who sold you the boat. When you are in uncongested and open water, take over the helm yourself and experiment. First put the helm hard-over against the stop, while running slowly, and observe your boat's turning-circle radius. Time the maneuver and record the rpm so that you know exactly how long she takes to make a complete 360° turn. Repeat the maneuver with the wheel to the opposite side and again note the elapsed time.

Most boats, especially those with a single screw, do not turn identically in either direction. The propeller torque in a right hand screw will deflect the vessel to port; a left hand screw will deflect the vessel to starboard.

To determine what "hand" your propeller is, imagine your boat up on the ways with you standing aft of her looking toward the bow. If the direction of blade rotation is clockwise, it is a right hand screw; counterclockwise, a left hand screw. Some engine manufacturers stamp an arrow on the propeller shaft coupling flange to indicate directions of prop rotation.

Twin-screw vessels usually have an engine installation with each propeller turning in opposite rotation. The sideways

**boat hitches:** see trailering
**boat ignition:** see emergency boat repairs

thrust of the stern as a result of torque is therefore largely canceled out. When under way with the helm amidships, there is no tendency for the craft to deviate from a straight course.

Part of the big boat feel is a result of inertia, the law which states that a body at rest tends to stay at rest; that a body in motion tends to stay in motion. As a result of the operation of this law, it will take somewhat longer for your boat to gather steerageway when you are undocking, and it will take longer to bring the boat to a dead stop when you are docking. The bigger boat will "coast" much longer. This difference alone between the handling of a small and a large boat can get you into trouble if you are unprepared for the change.

To learn your new boat's mannerisms try simulating docking and undocking. Choose a mooring buoy in open water to represent an imaginary dock and ease your boat alongside as skillfully as you can. When you back down to kill your forward way, make a note of the time that elapses between the period when your boat is moving ahead, through the period when she is dead in the water, till she begins to gather sternway. This will give you an idea of her ahead-to-astern reaction time. Repeat this maneuver at various settings of the throttle, say, 1000 and 1500 rpm. Often, if you are encountering strong winds or current, you will want to make your approach at greater than normal maneuvering rpm. A good method to head into a dock is at 45° to it, pointing into the current or tide, whichever is stronger.

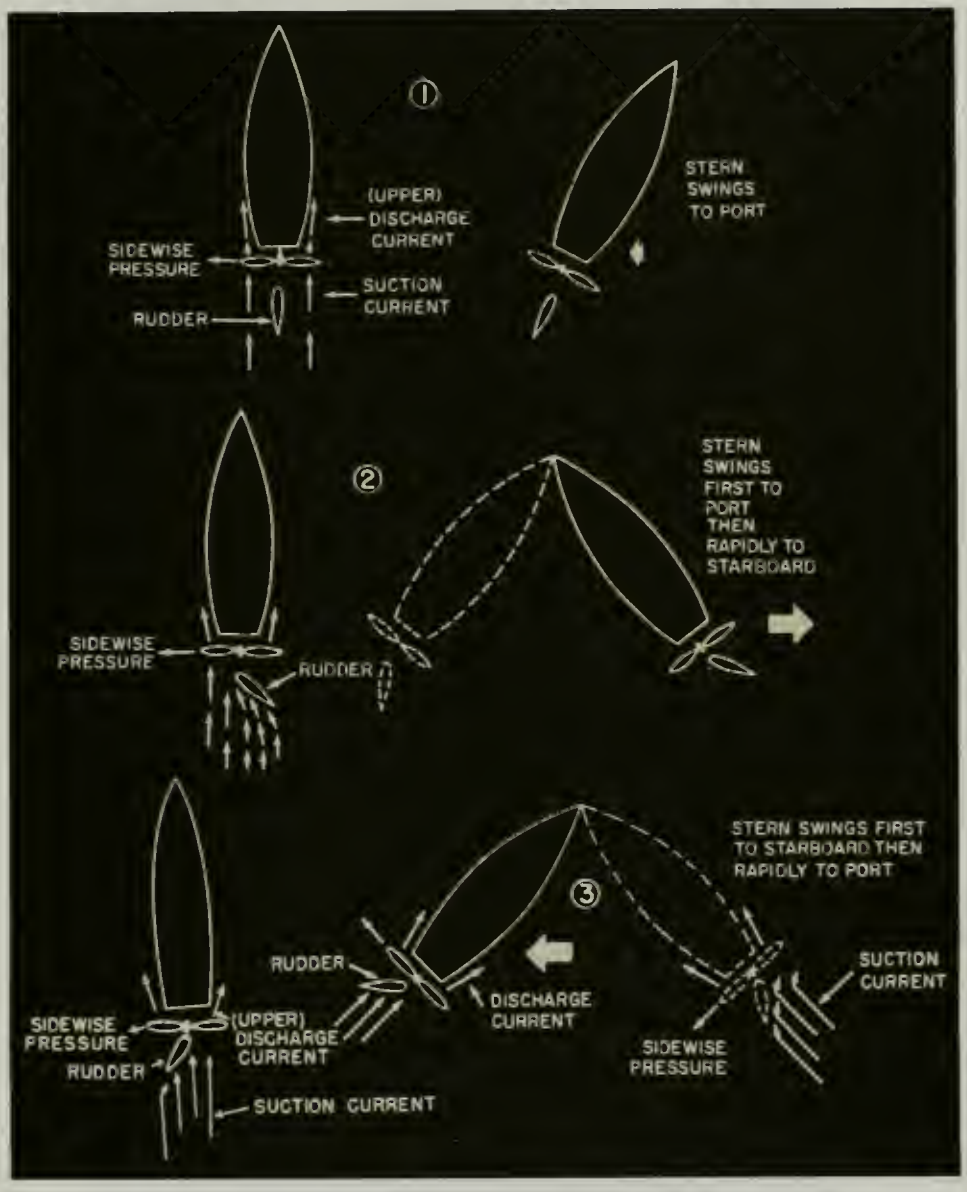
*Rudder action.* If your previous boat was an outboard or had an inboard-outboard drive, when you put the tiller or the helm hard-over, the propeller itself turned and its whole thrusting force helped to turn your boat. This is not the case with the inboard; it is the thrust of the prop stream against the rudder blade which is the major turning force. This force is considerably less than that exerted by the outboard's turntable lower unit. Be prepared for a much slower turning time with the inboard. Remember, your new boat will not be as maneuverable in tight spots as the small runabout, so plan your strategy in advance if you want to look good to the rubbernecks on the dock.

One trick in maneuvering that often comes in handy is the ability to kick the stern around with several bursts of power against the rudder blade. If properly done (and practiced first offshore), this will turn the boat smartly without her gathering forward way. When kicking the stern around, you should turn in the direction which the propeller torque would naturally deflect the bow, i.e., to port with a right-hand prop and to starboard with a left-hand prop.

For example, if you wish to make a tight turn to port in a vessel with a right-hand prop, put the wheel hard-over to port. Engage the clutch and advance the throttle quickly almost to maximum rpm, then close the throttle again *immediately*. If the throttle opening and closing is done quickly enough, the bow will swing sharply to port. Next, allow the craft to settle or find her heading for a moment, and if more turning is required, repeat the maneuver.

Be careful not to keep the throttle open so long that the boat gathers forward way or you'll be in trouble. We repeat that this is a gambit that should be practiced for the first time only in open and uncongested areas. Later it will be part of your boatman's skill in emergencies and when the need arises to make tight turns in narrow channels, or coming alongside a dock.

*Reversing quirks.* Unless you have a fully reversible pitch prop on your boat, she will behave erratically when reversing. When a craft has sternway at low speeds, the rudder is virtually ineffective as a steering aid. As speed astern picks up, a slight effect is gained. More important as a di-




▲ *Single-prop vessel with headway, propeller backing.*

rective force is the turning moment built into the hull as an effect of propeller torque. To acquaint yourself with her behavior, run your boat in reverse at various throttle settings with the helm amidships and watch her tendencies closely. Move the wheel to various settings and see how different rudder angles affect the backing. This reversing business is largely a matter of feel and there is no substitute for actual practice.

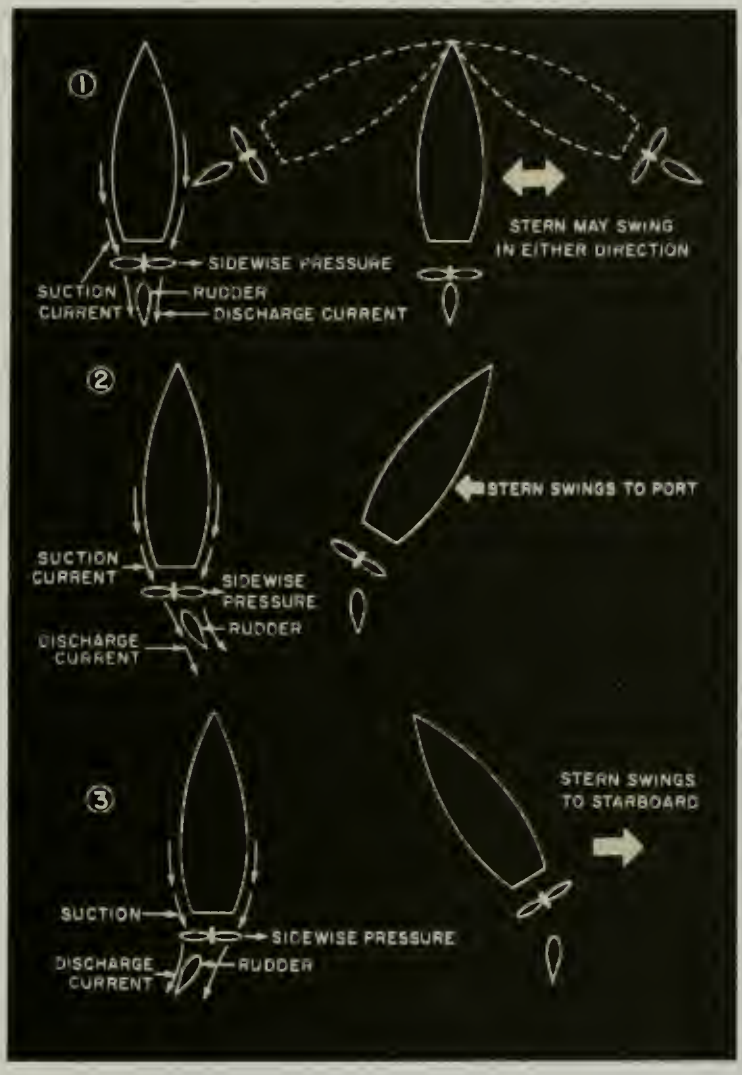
With a twin-screw craft it is possible to reverse one engine and go ahead on the other, thereby turning the boat on the

length of her own keel. It is one of the joys of operating twin-screw yachts. Remember, however, that the throttle setting on the reversing engine should be faster than on the forward turning engine. If the revolutions are equal the boat will creep ahead. This is because propeller thrust is more effective in the ahead mode. Props are designed for running ahead; to balance the thrust the reversing prop must work harder.

A word of caution. Never run your engine in reverse at high rpm for protracted periods. The reversing gear is not designed for constant load and the propeller-retaining nut may work loose against the shaft threads. Reverse for short periods, and only when necessary.

*Windage.* Generally the larger boat will present a greater amount of hull and superstructure to the wind than a runabout. This windage can be a considerable factor in maneuvering, and the skipper should be aware of its potential effect. An inboard with trunk cabin and a flying bridge can present as much impinging surface to the wind as a small sailboat. Pick a spot where there is little tide or current and let your boat drift. If your boat has a short dead-

CLOCKWISE -
RIGHT HAND PROP
If you stand aft of your boat and look toward the bow, a clockwise rotation . . .
SUSY II
COUNTERCLOCKWISE -
LEFT HAND PROP
ANN
. . . of blades indicates a right hand prop, counterclockwise a left hand prop.




▲ *Single-prop vessel with sternway, propeller going ahead.*

wood or a tapered keel aft, in a good breeze you may note a tendency for the stern to drift faster than the bow; conversely if your boat is designed with little forefoot, the bow may drift faster. When docking or undocking in moderate breezes, therefore, it may be necessary for you to apply a little opposite rudder to maintain a straight course. The effects of windage on the boat can frequently be utilized to facilitate docking. If you approach the dock on a parallel course, come to a dead stop and wait; the wind will drift the hull into the dock for an "egg-shell" landing.

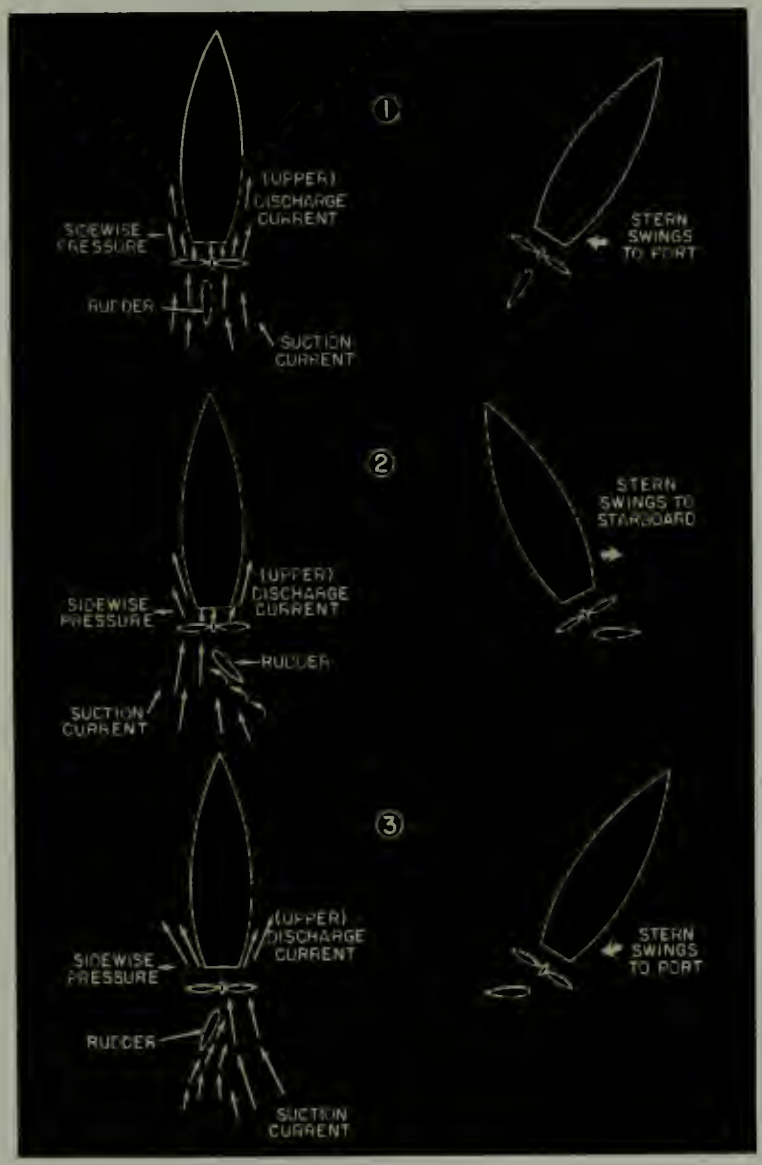
The way your boat responds to wind will be less noticeable, but nonetheless present, when maintaining a straight course for an extended period of time. Experience will soon show you how much rudder correction is necessary to compensate for leeway when passage-making.

*Developing competence.* When you move

up to a larger boat, your cruising ambitions will take a commensurate rise. You likely will plan trips of several days, or even weeks, duration. You inevitably will run into widely different conditions of weather, for the sea is not always benevolent. If your experience at passage-making has been limited to day sailing be sure that you acquire the basics of piloting, seamanship and good boat handling. You owe this to yourself, your boat and your passengers.

Enroll in one of the free courses given by the United States Power Squadrons or the U.S. Coast Guard Auxiliary and when you have graduated you will have enough practical knowledge for a start to become a first-rate skipper. J.D.

*See also:* BOATING; DOCKING, BOAT; NAVIGATION.




*Single-prop vessel with sternway, propeller backing.*

# How to Inspect a Boat

**You can't see through the paint, but following these tips will give you a rough idea of how well a craft is built**

*What better place to look at boats than a boat show, like this one at New York's Coliseum? To sharpen your buying technique, move from boat to boat checking out the points mentioned in the article.*

HOW CAN YOU CHECK the construction soundness of the craft you see at the boat show or at your local dealers? Boats on display are bright and shiny; you can't see what's under the gleaming paint or gel coat. Will the boat to which you take a liking last a lifetime, or will it decay in less than a decade?

When it comes to fiberglass boats, it's almost impossible to check the thickness of laminates in various hull areas. However, the thicker the laminate the greater the strength, and the thicker the laminate the heavier the hull. As a general rule then, the heavier the hull, in a given size and form, the stronger the construction.

But don't count on it. If a hull has areas of sandwich construction, where balsa wood blocks or plastic foams form a core between fiberglass layers, the builder gains a great deal of strength and eliminates a lot of weight. The sales literature should give details if this is the case. And you can always check with a salesman. If he doesn't know, he can find out for you.

Thickness of aluminum used in boats is governed largely by the size of the boat and whether it is of riveted or welded construction. In any case, the general rule applies: the heavier the hull, in a given size and form, the stronger the construction. But don't compare weight of a riveted boat to that of a welded one. The results would be misleading.

Very few wood boats are on the market now compared to a few years ago. Those available today, other than custom and semicustom yachts, are almost all built of marine plywood. This is true whether the boat is smooth-sided or lapstrake. New sealants and finishes have increased the life of wood hulls and reduced the traditional maintenance, so they're still a sound investment. Check the finish carefully; if the surface is perfectly smooth, it's likely that a plastic-face plywood has been used; if you can discern the grain of the wood, it's not plastic face. If you have a choice, take the boat with the plastic-face plywood.

With any type of boat you can examine some of the finishing details and they will

**boating rules:** see navigation
**boat maintenance:** see maintenance, boat
**boat repairs:** see emergency boat repairs
**boat storage:** see storage, boat
**boat trailer:** see trailer, boat

give you a clue to the nature of workmanship throughout the construction. Check cabin-to-deck joints, the fitting of interior moldings and cabinets. Are there exposed gaps, or is there evidence that trim strips cover such gaps? Are corner joints in woodwork poorly executed? Shoddy workmanship and cover-up tricks tend to indicate poor-quality construction where it can't be seen. Rough, unfinished fiberglass, metal, or wood edges under cockpit coamings indicate that the builder had more concern for external appearance than quality.

How is deck hardware secured? A cleat that is bolted through a deck is more secure than one that is screwed to the deck; a cleat that is bolted through a backing block is more secure than one bolted only through the deck. Any fitting that is subject to strain at any time should be bolted through backing blocks.

Be sure the hardware used is adequate in size and strength for the boat. A cleat designed to handle ⅜-inch line on an 18-foot runabout won't do when you need one for ½-inch line on a 32-foot cruiser. Also be sure all necessary hardware is present and accounted for—or at least be prepared to buy and install missing items. A line of boats that had no provision for anchoring was displayed recently.

At one time many boats were fitted with plate glass windows and windshields, and on occasion such windows were shattered by wave action, causing injuries to those aboard the craft. Production boats built today use safety glass or Plexiglas for all windows, so this isn't a problem with new boats. But if you're considering an imported boat, a custom-built job from a backyard operator, or an older boat, make sure the windows and windshields will be safe at sea.

Both the Boating Industry Association and the American Boat and Yacht Council have established standards for wiring on boats. While builders are not *required* to follow a standard, most use the BIA or ABYC specifications as a guide. The salesman should be able to tell you which standard was followed. You should be able to locate the main distribution panel for the boat's lighting system and any other electrical equipment that's fitted. This panel should be readily accessible, yet protected from the elements. Wires should be fitted with solderless terminals that are fastened with lock washers or double nuts to the terminal bolts. No bare wires should be wrapped around the terminal bolts, and there should be no soldered connections.

All circuits should be protected against overload by fuses or circuit breakers. Fuses, if installed, should be of the time delay type; the old-fashioned screw-in plug fuses must not be used. Circuit breakers are preferable to fuses and should be of the manual reset type.

Check the fuel tank and lines, if installed. All parts of the system should be accessible, and the system should be grounded. If portable tanks are to be used, be sure they can be stowed or secured so they won't bounce around in rough going.

Fuel and engine compartment ventilation must meet Coast Guard requirements; make sure that they do.

Finally, inspect the fabrics or other materials used for seats, cushions, interior panels, and headliners. These materials should be rot and mildew resistant, or they have no place on a boat. Check seams and edges; there should be no gaps and no evidence of unravelling.

Fortunately, both materials and construction methods have been improved considerably, and the reputable builders exercise a high degree of quality control. Your chances of getting a lemon are remote, but examine each prospective buy with a critical eye. You may find something the builder missed. T.B.

*See also:* HULLS; MAINTENANCE, BOAT; SAILING.

# Launching Your Boat from a Trailer

**Use these tips to get your boat in and out of the water safely and quickly**

LAUNCHING A BOAT and taking it from the water is nothing more than a means to an end. The goal to achieve is the ability to perform the job quickly and easily and to acquire the know-how to cope with a variety of launching situations.

Launching methods include trailer launching, using slings or hooks, and launching over natural terrain with the use of solid or inflatable rollers. Aside from any factor of launching fees, and all other considerations being equal, sling launching is probably to be preferred. Launching with hooks requires that properly reinforced lifting rings be installed on the boat, and they are not standard equipment on today's pleasure craft. Roller launching is usually performed only out of strict necessity. However, 90 percent of the launchings today are made from conventional trailers on a launching ramp.

As with most jobs, the key to success is proper preparation and having the proper tools and equipment with which to work. Launching a boat might be compared to painting a room in your house. You can't start simply by walking into the room and slapping on paint and still expect to end up with a first-rate result.

When it comes to boat launching, the preparation begins with the selection of the trailer. The trailer with all its accessories is the basic tool and must be selected to handle easily your particular size and type of craft in a variety of situations. The larger your boat the more important a perfectly functioning trailer becomes. It's one thing to muscle a 14-footer around, but it's quite

*Check boat carefully before backing the trailer all the way into launching position. If bow line is made fast and held by someone ashore, the boat won't drift out of reach once it is afloat.*

*Use a winch to haul a boat out of the water and onto the trailer. An electric winch should be used for large crafts.*

a different story to load a 25-foot cruiser on its trailer.

The basic outboard or inboard-outdrive boat trailer today supports the hull completely on rollers for maximum ease in launching and loading. On some models the entire weight is concentrated on the keel line with the side rollers performing a balancing function. Other designs utilize two long banks of rollers parallel to the keel which give support as well as balance. Also popular for outboards, and almost exclusive with inboard craft and many deep-V hull designs, are trailers with upholstered longitudinal supports, also called skids or pads, designed to spread the hull support over a large area. The more sophisticated models have a lever-operated mechanism which lowers the pads an inch or two to let the boat come to rest on rollers for the launching and loading operations.

Without the adjustment feature it is usually necessary, due to the friction of the pads, to submerge the trailer to the point where the hull will float free. The disadvantage in submerging the trailer is the

*Getting a boat in the water at an undeveloped launch area can be tricky. Make sure the bottom doesn't drop off sharply. If it does, it could cost you a trailer. And, make sure terrain offers enough traction for towing vehicle to drive back up grade at water's edge.*

*When launching or recovering a boat singlehanded, chock wheels of the towing vehicle. If help is available, you can have someone sit in the driver's seat with a foot on the brake.*

*Try to keep trailer wheel hubs out of the water, unless bearings have special seals to keep them dry. Driving any distance with wet bearings can damage them.*

*A dock near the launching site is a great convenience. Once in the water, a boat can be pulled by the bow line to the dock for boarding.*

potentially damaging results of allowing water to enter the bearings. This can cause deteriorating corrosive action on the bearings. A secondary problem results from the necessity of letting the back of the towing vehicle go so far in the water that there is danger of water entering the differential housing.

Most trailers are equipped with hand-operated winches, but for those with heavy craft an electric winch should definitely be considered. The greater the gear ratio the better the pulling power and the less the strain on the operator. With a winch-gear ratio matched to the weight of boat plus equipment, it's an easy matter for a woman to crank the boat on the trailer. Keep clear of the rear of the winch, and stand on the side, just in case the cable should snap. It's rare, but it's definitely a possibility.

For maximum efficiency the bow eye should be level with or slightly lower than the winch pull. Generally the manufacturers place the bow eye at the correct position and the winch should be adjusted to fit. This is not always so, however, and you'll sometimes see craft with two bow eyes—one for launching operations and the other for on-the-water towing.

One requirement for easy launching is being able to unfasten and refasten quickly the bow eye tiedown and the stern tiedowns. The best practice is to consider the winch cable as a secondary tiedown and use a turnbuckle for a primary tiedown. One primary tiedown is a turnbuckle with a hook on one end for the bow eye and an eye on the other connected to a length of chain bolted to the trailer. A variety of methods are used to hold the stern of the boat to the trailer. The easiest devices to remove are the spring-action tiedowns with quick-release levels and the turnbuckle adjustment tiedowns. Another popular practice is to use a strap outfitted with an easy-to-operate buckle.

Trailer taillights should *never* be submerged unless they are completely waterproof, which is more often fable than fact. A positive move is to remove the taillights, secured with easy-to-unfasten wing nuts, before each launching. Mount lights on side brackets to eliminate any light submersion problems.

If you install a catwalk on your trailer you'll wonder how you ever got along without it. Ever tried balancing on a slippery trailer in rubber-soled shoes and trying to snap the winch cable hook on a bow eye? With a catwalk, both launching and loading are greatly simplified. Some catwalks are simply two two by fours held to the trailer by brackets designed for the job by the trailer manufacturer. Catwalks can also be fabricated from metal or plywood.

A tilt-bed trailer is preferred by many boatmen with large, heavy craft. The pushing, pulling or submerging often required at inefficient launching ramps is eliminated. With sufficient close-in water depth it's easier to launch from the tilt bed, and when loading you get maximum water hull support to make the job easier.

Practice backing on an empty parking lot or in your driveway if you're inexperienced at towing trailers.

For an initial launching let's use a modern, properly designed, rough-cement-surface ramp which eliminates problems encountered on improperly designed or undeveloped ramps. Assume the launching is not solo but a two- or three-man affair. While the following launching techniques are not all-inclusive, they do provide a time-tested springboard for adaptations to meet various situations.

Pull the vehicle and boat to a stop in position for backing into the water, preferably on level ground. If on a slope, leave the driver in his seat to push the brake pedal in event of emergency, or else block a rear wheel.

Unfasten your primary tiedown and transom tiedowns. Unhook the trailer wiring

connector. Remove taillights if they will be submerged and see that the winch cable is taut and the winch locked in pulling position. Remove the outboard motor support if necessary.

Check all safety equipment including fire extinguisher, life jackets, anchor and line. Place key in ignition switch and hit the ignition to turn the motor over a couple of times to insure that the battery is functioning. Check the fuel supply and if low remember next time that it may be easier and faster to gas up at a highway service station. Double-check to see that lunches, sweaters, fresh water, and fishing or skiing equipment are aboard. Be sure the cockpit drain plug is secure. In short, make sure everything is shipshape and ready to go before putting the boat in the water.

Secure the bow line to the forward deck cleat and with line in hand stand clear and direct the backing of the trailer into the water. Be sure the trailer stops before the water level reaches the bottom of the wheel hubs and interior bearings. It's a good practice to have an outside observer who can see the back of the boat and the driver at the same time. Ideally, the rear center roller should be submerged or as nearly so as possible.

Unhook the winch cable and slowly push the boat off the trailer. At this point there are several different ways to handle the boat, depending upon the surroundings.

The boat may simply be given a good push to make it clear the trailer (be sure to hold the bow line tightly) and then pulled to shore alongside the ramp if the bottom is composed of fine gravel or sand and won't damage the hull. Often there is a dock adjacent to the launching ramp, in which case the boat can immediately be tied to the dock.

Another technique is to get in the boat as it glides away from the trailer. This is where the catwalk pays its way. The launcher can slowly push the boat from the trailer as he walks down the catwalk. It is then an easy matter to scramble aboard and start the engine. With three hands you'll have one person in the vehicle, one launching the boat, and the third in the boat before it leaves the trailer.

Many experienced boatmen always start their engine before the boat is completely free of the trailer. With a catwalk it's easy for one person simply to hold the boat from his position on the trailer until the engine fires up and the boat is under its own power. Of course the water depth at the transom must be checked before lowering the outboard motor or lowering the inboard-outdrive power unit. This is one place where the power-lift units on inboard-outdrive installations are pure luxury. In some cases, particularly with craft in the 18- to 24-foot range, the props can be used to help pull the boat from the trailer.

Starting the engine while on the trailer, or while the boat is being held by a person on the catwalk, insures against being set adrift and pushed by wind or current with an engine that suddenly becomes cantankerous. At times like this the vexed boatman wonders why he doesn't have a paddle and boat hook aboard so he can paddle toward the dock and avoid some rocks or other obstacles.

Loading the boat is generally the more difficult task, or at least presents more possibilities for difficulties. Many problems are magnified by weary, sunbaked bodies, and it's a good idea to preserve some of your sense of humor for the loading operation in case something goes slightly amiss.

The trailer is backed into the water in the same position as for launching, with the wheel bearings clear of the water. Prior to backing, release the winch lock and pull the cable to the rear of the trailer so it is ready for instant use. Then make sure the winch ratchet is in the loading position.

Getting the bow of the boat to meet the rear center roller is sometimes a problem,

especially in a heavy wind or while fighting a tidal or river current. This is one reason why side guide brackets equipped with rubber rollers are recommended. If the boat is not exactly on center the guides will direct the boat to the center of the trailer. The guides are especially helpful for a one-man loading operation when the helmsman must approach the trailer and then scramble over the bow and snap the winch cable onto the bow eye.

The helmsman moves the boat slowly toward the middle of the trailer. The man on shore is ready to snap the cable hook on the bow eye. Here again a catwalk can be worth its weight in gold. In warm, sunny weather everyone may be in trunks or shoeless, but when the water's cold it's a lot more fun to stay dry. With a catwalk it's an easy matter to help guide the boat to the proper position, snap the hook, move quickly to the winch, and immediately begin pulling the boat onto the trailer. After the boat is partially on the trailer the helmsman can move across the foredeck and drop to the catwalk to lighten the load. Or if the boat is large and his additional weight is not a big factor he may stay aboard and move forward to help get the bow of the boat down sooner and make the loading easier.

As soon as the bow is snug against the bow stop, secure the primary tiedown before pulling away from the water and onto level ground to prepare for the homeward journey.

Always block the rear wheel of the vehicle with a rock or timber, or carry a manufactured chock, if you must leave the driver's seat unattended. In addition to being a safety factor, the wheel block will help you drive your vehicle up a wet ramp (all ramps get wet from the boats dripping water) by preventing the rear wheels from slipping backwards before receiving their forward thrust.

Shallow water at the edge of the launching ramp is a problem often faced on older ramps, in out-of-the-way areas, and on reservoirs and other bodies of water that are subject to fluctuating levels.

The accepted method in this situation is to disconnect the trailer and push it into the water. For this operation the first step is to make sure there is not an abrupt drop-off that will claim the trailer and make recovery difficult if not impossible. For any size boat the practical accessory is a landing or nose wheel. This will permit you to roll the trailer into the water (and around your driveway at home) without having to manually support the tongue weight. In any event, always have a line or cable securing the trailer to your vehicle.

And just because you get your boat into the water with the trailer attached does not always mean that the reverse will be true. The occurrence of a water drop between launching and loading can make you very thankful that a steel towing cable is included in the miscellaneous equipment you carry in the car. The loading operation is a matter of securing the trailer tongue to a cable or line and pulling the trailer onto dry land for hitching to the vehicle. This is one situation where it is necessary to submerge the wheel bearings. If you are not equipped with an effective bearing-protector device and have a long trip home, the bearings should be attended to as soon as possible.

The greatest advantage that you as a trailerist have is the mobility to range far and wide in quest of new boating horizons. And the ability to quickly and easily launch and load your boat without any physical or mental strain is a giant step toward receiving a maximum amount of pleasure from your craft. Just remember, if you select a proper trailer and outfit it with husky, workable equipment, you'll laugh your launching difficulties away. P.P.

*See also:* SAFETY, BOAT; STORAGE, BOAT; TRAILERS, BOAT.

# How to Test Your Own Boat

**Turn yourself into a test skipper to learn how well your hull and motor will perform**

How good is your boat—or the one you want to buy?

Why not find out for yourself. Follow the directions given here and make your own tests. You will get a good idea if your boat is running properly, is handling smoothly, and is delivering the speed and fuel economy you should expect from it. Take along the checklist outlined here if you plan to go boat shopping as well. Even if you are new to boating, you will be able to tell if the boat will give you the kind of operation you want and should expect from it.

And suppose you've spent a lot of time on the water already—what is left that you should still learn? If you can't write down right now the difference in speed that putting three more passengers in your boat will cause; if you haven't figured the safety load for your present flotation capacity; if you aren't sure offhand what the first single item is the most important to look for when you look at a new boat, or go along to help a friend look for one—read on.

Selecting a boat is *not* like buying a car. Neither is building one. You can safely assume any modern auto you choose is going to run well, and that no matter what kind of bargain you are offered, it will still come equipped with steering wheel, lights, seats, and basic safety equipment.

Not so with a boat. Read a boat-for-sale ad and *you* may still have to see the craft to find out if a properly rigged steering wheel is included in the price, legal navigation lights are installed, and an anchor comes with it as well. And as for construction, no amateur down the block is likely to go into business manufacturing cars—and then move away after he sells a few. But it can happen in the boat business.

Cars also come in fairly standard sizes, with two doors or four. Not so with pleasure boats that at one boatyard may range from eight feet up to eighty. There is a lot you need to know if you want to tell if you're buying a good boat, or own one. Most cars run down a smooth road smoothly enough. Yet even on smooth water, a badly designed, powered, or set-up craft can porpoise along on flat water as if it wanted to pound out your upper plate.

*Let's start at the beginning* and answer a few test questions even before going afloat. Would you like to drift down the Mississippi in a houseboat? Cruise to Tahiti or Bermuda? Or just spend long weekends

living aboard at anchor up some quiet bay or river bend? Who wouldn't—but is that the kind of boat you ought to own? Some boatmen with $1000 or so to spend go out and buy a big old cabin bargain, waste a summer trying to keep it afloat, then give up the sport and sell out come fall. What they should have had was a new runabout without half the hull filled with a cabin and bunks they would hardly ever use.

Be honest with yourself; that's your first checkpoint. If you now have a boat that won't go as fast as you'd like because it wasn't designed that way, why not face facts, sell it, and get what you'd really like. And if you're a shopper, figure out first just how often you'd actually sleep aboard. Then pick the boat that will take you where you'll want to go this year, instead of the one to answer those someday dreams.

Still not sure the boat you want is the right one—or the one you own is wrong for your purposes? Go rent or charter that craft that seems so ideal. Test it for a few weeks or a season and see.

*If it's a new boat* you're looking at and considering buying, first examine it for a small sticker or plaque that gives the recommended maxim powerplant rating and load capacity.

These specifications give you the ground rules for the start of any outboard test. Carry more weight or clamp on more horsepower than recommended, and you're not only violating the performance design of the boat but endangering yourself and your passengers as well.

If the boat hasn't got one of these stickers, find out why. Builders can obtain the formula for figuring these vital statistics from the Boating Industry Association in Chicago, and so can your dealer—at no expense—along with free stickers. So the capacity tag is the first thing to look for in any new outboard boat. If yours hasn't got one, it may have been built by some small fly-by-night operator. Great Britain is ahead of us in this area; boats must have a similar capacity tag in order to be allowed into the big annual London Boat Show.

The second observation check is to note if the boat is a type that has proved suitable for the local water conditions. No calm water skiff is going to test out properly if your usual conditions are rough chop, though a hull that can handle heavy going often does very well over smooth seas also. When there's a choice, the more rugged—and often more expensive but safer boat—is, of course, the better buy. Circle the boat and note if you see any signs of poor or cheap materials or workmanship. You can't cut corners when you're going out on the water. It can be a very wet walk home.

*Now we move aboard* for a closer look. Old boat or new, how does your choice rate in construction basics? Shatterproof windshield? Forward deck strong enough to be stepped on? Non-skid cockpit flooring and without obstructions to stub or trip a bare toe? Hand grips or grab rails for passengers, plus safe spots where they can hold on under seats, dashboards or gunwales without getting stabbed or cut by rough fiberglass, wood, or metal edges and splinters? The driver can usually hold the wheel and brace himself, but how about his crew? Grip that steering; is it firmly anchored, yet moves freely without any feel or sound of slipping or binding? With a motor of 20 hp or more, a wheel forward should be

**BOAT TEST CHECK LIST**

**Ashore:**

Look for:

Capacity & Power plaque; substantial construction; hand holds; steering, chocks, cleats; all required safety equipment

**Afloat:**

Test for:

Slow maneuvers—forward, turns, astern

Medium speed—trim, planing angle; wake crossing; cavitation; torque; turn tripping or skids

Fast speed—measured top speed; tight turns; chop-throttle reaction

Cruise—rpm and speed; fuel consumption

*Does the boat plane with a level ride? This is one of the operating characteristics that can be checked by taking it for a test trip.*

used, instead of trying to turn by using the tiller astern. Even on a very small boat, a forward helm may be better since it can improve the balance and trim of the hull. Steering wheel ratio should not be so quick that a little motion might swerve the boat and tend to throw out the driver.

Any craft that can top 10 mph should have a transom or bottom drain so that bilge water can be siphoned out at speed, as a supplementary bilge pump. Adequate cleats and chocks for anchoring, towing and mooring lines are essential for boats of any size.

*Tests under way come next* in this—or any—boat evaluation. If a greedy dealer wants you to buy without a demonstration ride, and if he can't give names of other owners with whom you can talk, move down the waterfront to some other dealer. Certain sleek-looking craft are dogs when they start pounding through the waves. Don't buy a boat that makes smooth water rough, and if you already own one, get rid of it.

Ride in as many different boats as you can, but don't necessarily offer opinions to their owners—you may be wrong. A boat may only plow along because it's overloaded, or pound because passengers are seated incorrectly. The hull you may think is ideal on a flat calm may start to porpoise in a chop or become unmanageable in a following sea. You'll learn a lot from riding experience. Craft that seemed very superior a few years ago were often not designed to take today's higher horsepowers, and many are outdesigned by today's advanced hulls.

Let's try some maneuvers once you've checked the craft for approved-type fire extinguisher, life preservers, horn, lights, flame arrestor on the carburetor and bilge ventilators if required, plus anchor and enough line. Slow motion comes first as you get the feel of the craft. Even experienced boatmen have gotten into trouble with hotshot high speed passes in craft in which they were unfamiliar. "Sure our boats could be dangerous at speed," said one fast runabout builder of a few years ago. "But anyone that drives them will find that, with the small rudder blade area, the boats won't turn at high speed; a driver will promptly learn he's got to slow down and wheel her over carefully if he's ever going to change direction!"

Get away from the dock, well away from other boats or where your wake might possibly rock them, and then try slowly approaching, backing away and circling a buoy or bit of driftwood. Throw a balled-up piece of paper overboard if necessary, as a target dock. Outboards and sterndrives are normally easy to maneuver, but a straight inboard can be tricky to handle, particularly if you have to turn backing up. If your first slipspace is going to be in a very crowded harbor, it may be sensible to pick a boat that is easiest to get out and back, particularly if you'll have currents and winds to worry about as well.

*Now give the craft moderate throttle* and try straight runs and turns in both directions. Because of engine torque, one direction may be easier than another but if the hard way is really difficult, the set-up may be wrong. With an outboard motor or I/O, have someone ashore note if the drive shaft is at right angles to the water, or is kicked under too much or angles out. Change tilt pin holes if necessary. Also have them check the level trim of the boat at various speeds. The bow is likely to lift as the hull rises on plane but then should drop enough to give reasonable visibility. Adjusting passenger positions and gear may help.

Viewing from ashore also helps in judging the attractive lines of the boat. If you are not sure about her looks, consult with experienced boatmen. Some companies turn out craft that are too ugly to resell easily.

When turning at this speed, does the hull skid considerably? If you had to cut over suddenly to miss a drifting log, would you slide into it? Do you get the sensation the boat wants to spin out and swap ends? Or flip? Better get a different boat unless this one has a lot of other advantages and you usually plan to go slowly. Does the boat tend to roll into a steep inside bank as it turns, or stays quite level? These are characteristics of rounded bilge versus hard chined craft, and either way is all right as long as the boat does not show signs of becoming unmanageable.

Attempt some runs at an angle across the wake behind another boat. Don't pick a big commercial craft, at first, or you may find its stern wave is steep enough to swamp you. Crossing at about a 45-degree angle is best, and use a slow speed. You should be able to hold your direction without being spun around too much; a deep-V hull design should have little or no trouble. Then try an open exposed area where winds or currents are stirring up a chop or swells. Head into them, away from them, across them at differing speeds. There should be angles and velocities when you get the least amount of banking and bumping around. If rough water is typical and your hull just doesn't like it, better try for a more seakindly design unless you like punishment and enjoy solo boating because your friends won't ride in your boat more than once. And where does the spray go? Some craft seem to suck stray water aboard. If your boat is exceptionally smooth riding, it should have clean enough lines not to throw much spray, or waterline spray rails may help. But if your boat soaks you down every time you're out, trade it in on one of the modern models that keeps the water out where it belongs.

Before you're through with turns, try adding throttle rather abruptly. If the motor revs up and tends to break loose and cavitate, it may be set too high if it's an outboard. With an outdrive you're in more trouble unless changing the tilt angle will cure it. A different pitch prop can also help. Abrupt high speed turns can get the prop sucking air on any light outboard with the engine set high for best speed; you'll need to develop a feel for how tightly you can wrap her into a curve.

Finally, for your turns, try chopping throttle part way through. At first, don't try this at full speed. Don't try it at all if

← *Placement and visibility of instruments is important. Also, make a timed run over a known distance to determine maximum speed and speedometer accuracy.*

you're suspicious about the hull's seaworthiness. You may find the boat wants to spin or toss you out, or take a foaming following wave right over the transom and swamp you.

*How fast will your boat go?* The boat you have out for a trial run doesn't have a speedometer? You don't have a stopwatch along and your waterway doesn't have a measured mile handy? Whose has? Instead, buy yourself one of those $5 hand-held plastic tube speedometers, or a $5 wind-speed indicator. The wind-one you can more or less check by holding out a car window, if *you're* not driving. Neither of these gadgets are highly accurate. Neither are the average chromed-up speedometers you see in boats. One of the big consumer testing outfits checked some cheap water speedometers and reported they weren't very good. Anyone could have told them that the jobs under $25 will help you set your throttle but aren't too likely to tell too much about your precise speed. If you need careful measurements, get one like the drag boys use. A true reading may depress you because it won't be as high as you think you're going, or anywhere near speeds your friends say they do. But it will tell how long you'll take between two points, and in a fog that can be very important. If you have an investment choice between a tachometer and a speedometer, pick the tach first, however. It will give important readings on your engine condition and the proper prop to use, and can be calibrated for approximate speeds as well. Use it and/or your speed gauge to determine throttle setting for best cruise. Then you can start determining fuel consumption for long passages, estimated times, and much other important data.

And when you're tired of running around, anchor and see how much your hull type wallows with the engine off. It will roll, but shouldn't try to turn over or dump your drink when another boat goes by. A boat's behavior lying at anchor is important; you may spend your most pleasant hours afloat that way. E.M.

*See also:* BOAT HANDLING; BOAT BUILDING; MAINTENANCE, BOAT.

# Bonsai

**The ancient Oriental art of creating exquisite dwarf trees. Here are the basics on styling and growing**

BONSAI probably originated in China before the 11th century as dwarf trees developed from small temple landscapes. At first, deformed trees were considered good art. By the 16th century the art was established in Japan and in the mid-1800's growers in Azakusa Park, a famous nursery center near Tokyo, turned to the more natural forms we use today.

The art came slowly west. An exhibition was held in London in 1909, and about the same time a grower from Yokohama brought to New York the first bonsai.

Now, every month, hundreds of Americans are attempting bonsai for the first time. There is an international society, Bonsai Clubs International, on the West Coast and an American Bonsai Society in New York. The Brooklyn Botanic Garden, one of the first bonsai centers in this country, has offered classes in culture and techniques for years, and registration has steadily increased. In many large cities, major shows and demonstrations are held each year, and the attendance is astounding.

*Basic information.* For your first bonsai, why not try a "quick" bonsai? It can show how basic bonsai techniques fit together. You can learn pruning, styling, wiring and potting.

Select a small, sturdy plant from a nursery. If it is in a container, the root system will be easier to handle. A pine or juniper is a good selection, but you could choose pyracantha or any of several other hardy shrubs as well. The best plants are tough and fast-growing, a combination that withstands the shock of "instant" pruning.

Keep techniques simple with your first tree. Shape and prune the plant in the container. Once it is removed, the roots are exposed and you must keep them moist.

Consider the possibilities of the plant you have chosen. Separate the foliage to determine the importance of each limb and decide which branches are essential to your design. Develop a "feel" for structure. If the tree is bushy, remove unimportant branches just to expose the trunk—a key element in styling. Next, remove crossed branches and weaker ones that may die.

Check the importance of each limb by blocking it with your hand. If the design remains strong and vital with the branch blocked out, you know that branch can be removed. Be slow to remove deadwood, especially on conifers, until you are convinced it can be spared. Old, bleached wood called *jin,* often adds character.

Bend the branches in several directions to see how lines affect styling. Organize branches into interesting groups, uneven

▲ *Small plants, as in this bonsai of Japanese maple, are scaled to look like large ones.*

▲ *Gnarled roots are prized by bonsai enthusiasts. They contribute to the overall "design" of your tree.*

▲ *This old bonsai of flowering plum has twisted trunk. Note how wires are used to bend branches to form bonsai to the desired shape. Attach wires to trunk as shown in close-up.* ➤

◀ *This bonsai of cotoneaster has been shaped to a traditional form.*

elements of three, five and seven, for example.

You can prune with a sharp knife, a razor blade or even your garden pruners, but the work goes better with shears, and you may want to invest in special bonsai shears. Downward cuts will produce smaller scars and direct water away from the wound to help prevent rot.

Once your instant bonsai is styled, remove it from the container and proceed with root-pruning and potting. Use any good sandy loam. Later, when your bonsai is established and in need of repotting, you can change soil mixtures if required.

Root-pruning does more than make it possible to fit your plant into a small container. It stimulates growth, promotes health, and proportions the roots to the reduced top. Remove soil only from roots you plan to cut. The Japanese traditionally do this with chopsticks but prodding may cut and bruise roots. Gently work the soil free with your hands or wash it off with water.

The root-ball can be cut with a knife, hatchet or shears. Slice across the bottom, parallel with the soil surface (unless your tree is to be planted at an angle to the pot; then make the bottom cut parallel to the container). Trim off uneven roots. The base should be flat to promote the development of a shallow, spreading root system.

Select a bonsai container with at least one drain hole in the bottom. Cover the hole with fine wire or nylon mesh, and add a layer of quarter-inch pea gravel or sponge-rock (perlite) for drainage. The drainage layer should be no thicker than one-fourth the depth of a shallow container.

Cover the drainage material with a sprinkling of soil and position the tree, spreading its roots. Hold the tree in place and work soil around the roots. Strike the container sharply to settle the soil. Keep the top about one-quarter inch below the rim of the container to prevent erosion. Pack it gently with your fingers.

Water your bonsai. Moisten it first by soaking in water slightly deeper than the container, or if you cannot do this, sprinkle the tree gently from above. Ground-covers, moss for example, can be added.

Keep it in full shade for a week and then gradually increase the amount of sun until your new bonsai receives the full amount needed by the species.

*Wiring.* After you have created the basic design by pruning, use wire to develop form and to correct branch defects. The technique is simple. Malleable yet strong copper wire is wrapped around parts of the tree, then the wired section is bent. Growth is forced to follow and the new contour becomes permanent.

You can develop an individual style for each tree without violating its natural form. As a rule, branches on conifers are wired down, those on deciduous trees are wired horizontally or even upward. Direction depends on the way a tree grows in nature, and also on your purpose. If you want to create an impression of age, prune a tree with soft edges, clip terminal growth, and wire branch tips downward. If you want a tree to seem young, train the branch tips upwards.

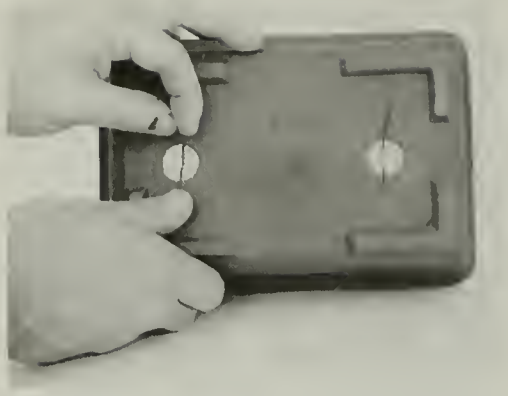
Copper wire is traditional; galvanized iron is used only by commercial growers. It is stiff and difficult. It can rust, cause stains, and rot the wood. Copper is easier and will not stain.

You will need several gauges. If you want a complete supply, buy from No. 4 to No. 24; if you want only the essentials, order two or three between No. 10 and No. 20, plus a length of No. 4 or No. 6 for thicker wood. These last two are sold by hardware and electrical shops as "grounding wire."

In Japan, copper wire is annealed, that is heated over a straw fire to proper temperature and a dull red color, and then

*A young pine, which has been developed in the traditional bonsai form. This is a tree that can easily be duplicated at home by the beginner at bonsai.*

*Bonsai is trimmed along the roots so it will fit into the container. Cut should be flat with the plant and loose roots should then be trimmed carefully.*



*Screens are held in place with pins made from copper wire. The pins are placed through the screen, then bent over holes in the bottom of the container.*

*The surface around the trunk is sloped gently in order that trunk may be exposed and natural appearance of surface areas may be increased in proportion.*

cooled. Annealing softens wire and dims the surface. Much of our electrically-treated wire needs only dulling, which can be done over the flame of a gas range; or use an all-purpose butane torch to work small quantities. Avoid overheating; it makes wire too brittle.

Begin wiring at the base of a tree, first with the trunk, then the lower limbs. The branches below should be finished and ready for reference.

Most trees require three gauges of wire. A good working rule is this: use thinner wire when a tree is growing, thicker wire

when it is dormant. The *right* wire is the thinnest that will hold a branch. If your heaviest wire is not strong enough, use two strands. Wrap the second wire parallel to the first.

Wrap the wire in spirals, generally on one-inch centers, although spacing is not critical as long as the wrappings are neither too far apart (with little holding power) nor too close (with serious chance of scarring). Don't wire buds and leaves.

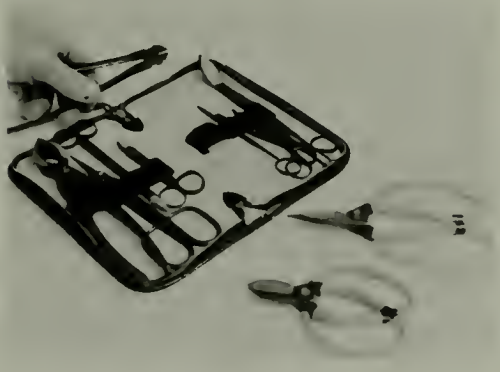
One end of the wire must always be anchored. When you work on the trunk, anchor the wire by inserting one end in the ground as close to the tree as possible. When you wire a branch or the top of a tree, anchor the wire to a limb or to the trunk.

When wiring is finished, set the tree in a shady place for a week or two. Water frequently, misting leaves the first two days. Be sure to remove wires before they can disfigure the bark; and the timing depends on growth rate of the plant. R.L.B.

*Adding soil made of rich loam and sand which has first been sized through a screen. Pat soil around tree to remove air pockets and insure good rooting.*

*Copper wire should be carefully bent around the trunk by winding it into a gentle, even spiral similar to that shown in photo above.*

*This bonsai kit contains several cutters. Including wire cutters and nippers for limbs and smaller branches. The shears beside kit are good for root pruning.*



*Bonsai should be placed in the container and arranged so that the trunk and limbs appear to be in balance with the container, as shown in the example.*

# Decorative Bookshelf-table

**The monotony of sanding, staining, rubbing and waxing is eliminated from this unique weekend project by a prefinished panel of Java walnut.**

SIMPLE IN DESIGN and construction, this unique bookshelf-table in brightly finished walnut is made of prefinished wall panels and molding. This eliminates one of the biggest headaches in furniture making —finishing. Not only is that tedious operation bypassed, but sanding is eliminated since all exposed edges and surfaces are prefinished.

To most craftsmen, the finishing operation is a necessary evil. And this is especially true when working with open-grained woods which must be filled, sealed, stained, lacquered, rubbed and waxed. But this is all done before you even start this project, and it's no ordinary finish either. Scientifically applied, the finishes of better panels are similar to those found only in the top grades of furniture. So with half the battle over, you should have no trouble building this attractive contemporary piece.

Costs will vary depending on the panels and molding used. The table shown was built for about $25 using a panel of Java walnut with a birch inlay. The panel is grooved, with 16 inches between grooves. The birch strip is only one inch wide so little is wasted when ripping the panels. The top is made by joining two sections with a butt joint. If care is used, the joint will be almost invisible. If a one-piece top is desired, a Weldwood flush panel may be substituted. Such panels are higher in price, however. Manufacturers offer a choice of woods.

The prefinished panels are only ¼-inch thick so they must be supported by a heavier wood such as ½-inch fir plywood. This is ideal as the total thickness of ¾-inch is compatible with the stock molding.

To simplify construction, cleats are used throughout the assembly. This eliminates the need for dadoes and rabbets. It also cuts down on the tools needed. A saw, drill, and screwdriver are sufficient.

Start the construction with ripping of the prefinished panel. Cut away the grooves then set the panels aside while you cut the ½-inch plywood to the sizes shown for the top and bottom. Note that the top panel is

**bookshelf:** see shelves
**boots:** see camping equipment

▲ *Construction of the bookshelf-table is simplified by use of cleats throughout assembly.*

▲ *Error-prevention tip: scrawl a number on the various sections before assembly, as shown.*

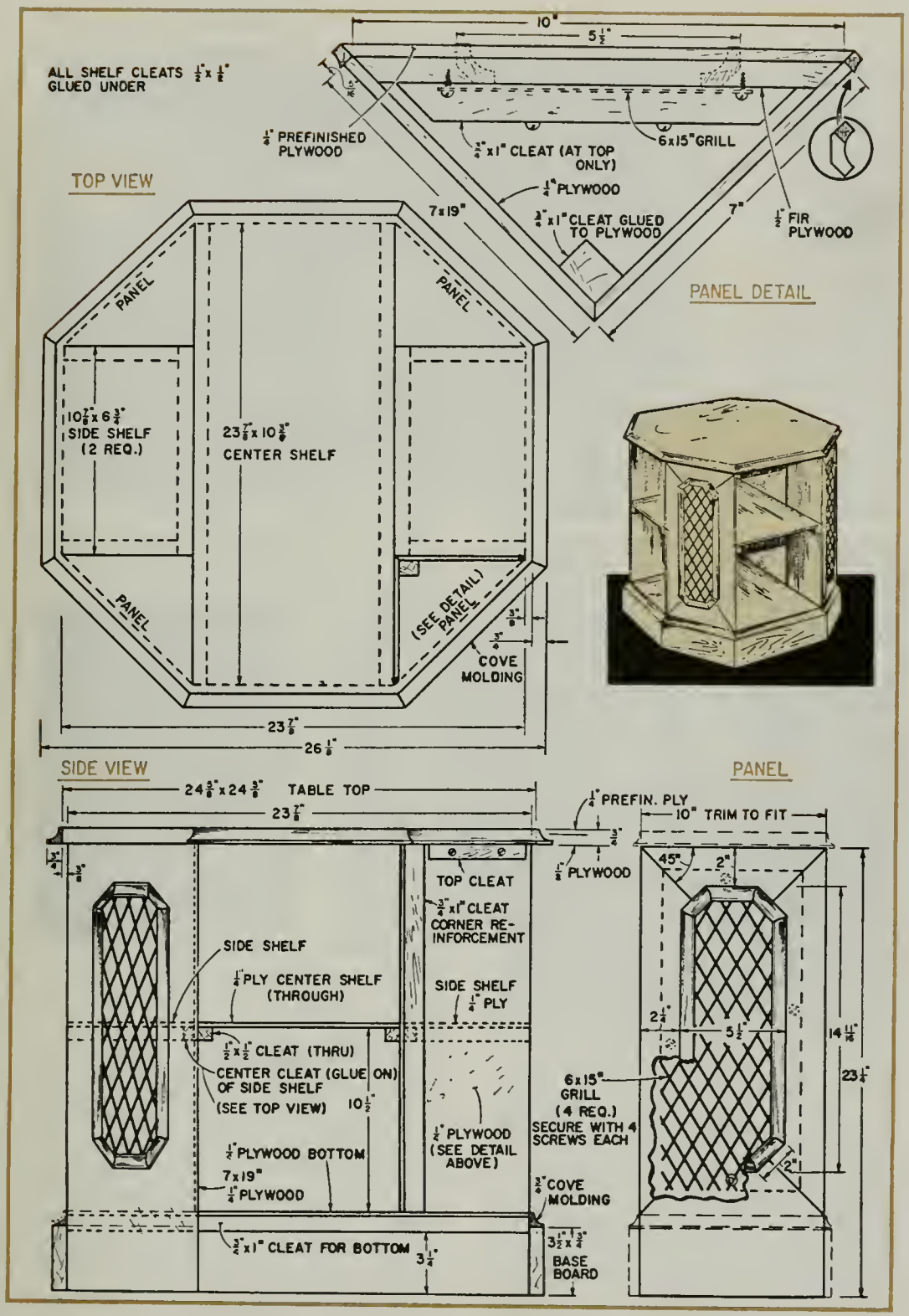
▲ *If top is perfect octagon, the flat-to-flat measure should check.*

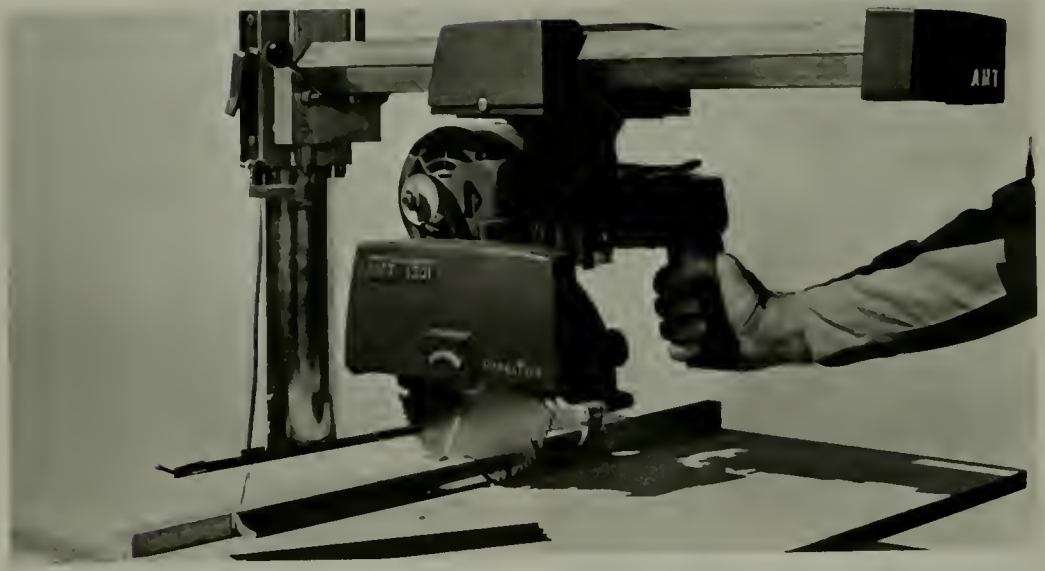
▲ *Cove molding is assembled in this manner. Note that piece is inverted at this point.*

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 1 | 1/4" 4'x8' prefinished plywood | outer surfaces |
| 1 | 1/2" 4'x4' fir plywood | inner surfaces |
| | 3/4"x30' cove molding | |
| | 3/4" 1"x12' cleats | |
| 4 | 6"x15" polished brass grille | |
| as needed | 1 1/4" round head screws | |
| as needed | 1/2" round head screws | |

**NOTE:** Also need, white glue and washers.


ALL SHELF CLEATS ½" x ½" GLUED UNDER
10"
5½"
¼" PREFINISHED PLYWOOD
¾" x 1" CLEAT (AT TOP ONLY)
6 x 15" GRILL
TOP VIEW
¼" PLYWOOD
7 x 19"
¾" x 1" CLEAT GLUED TO PLYWOOD
7"
½" FIR PLYWOOD
PANEL DETAIL
PANEL
PANEL
PANEL
10⅞" x 6¾" SIDE SHELF (2 REQ.)
23⅞" x 10¾" CENTER SHELF
(SEE DETAIL) PANEL
⅜"
¾"
COVE MOLDING
23⅞"
26⅛"
SIDE VIEW
24⅜" x 24⅜" TABLE TOP
23⅞"
¾"
¼"
TOP CLEAT
¾" x 1" CLEAT CORNER RE-INFORCEMENT
SIDE SHELF
¼" PLY CENTER SHELF (THROUGH)
SIDE SHELF ¼" PLY
½" x ½" CLEAT (THRU)
CENTER CLEAT (GLUE ON) OF SIDE SHELF (SEE TOP VIEW)
10½"
½" PLYWOOD (SEE DETAIL ABOVE)
½" PLYWOOD BOTTOM
7 x 19"
¼" PLYWOOD
¾" COVE MOLDING
¾" x 1" CLEAT FOR BOTTOM
3¼"
3½" x ¾" BASE BOARD
PANEL
¼" PREFIN. PLY
10" TRIM TO FIT
¾"
⅛" PLYWOOD
45°
2"
2¼"
5½"
14 11/16"
23¼"
6 x 15" GRILL (4 REQ.) SECURE WITH 4 SCREWS EACH
2"



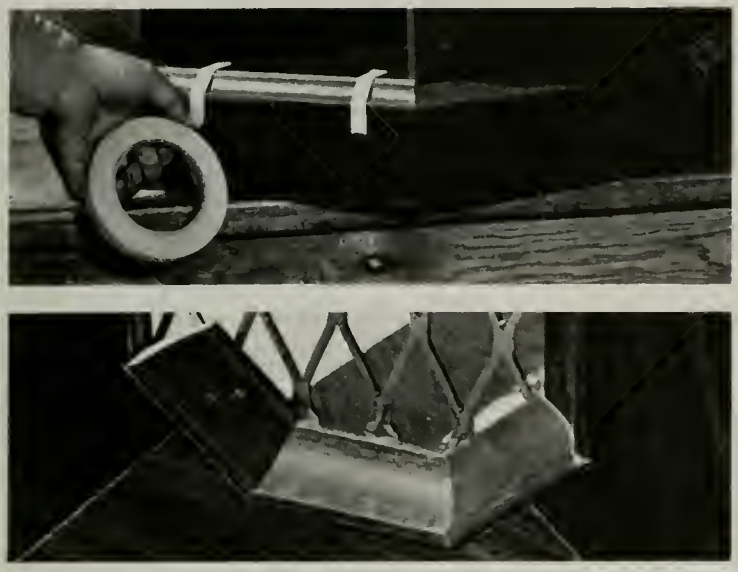
*Radial arm saw makes quick work of trimming molding; stop gauge is used for similar pieces. Left to right below: checking fit of parts before assembly; grille, held by screws at each corner; and gluing up of the parts. Used is white glue; it sets fast, dries clean.*

larger than the bottom as it overhangs the sides slightly. The shape of these pieces is octagonal. See detail for actual sizes.

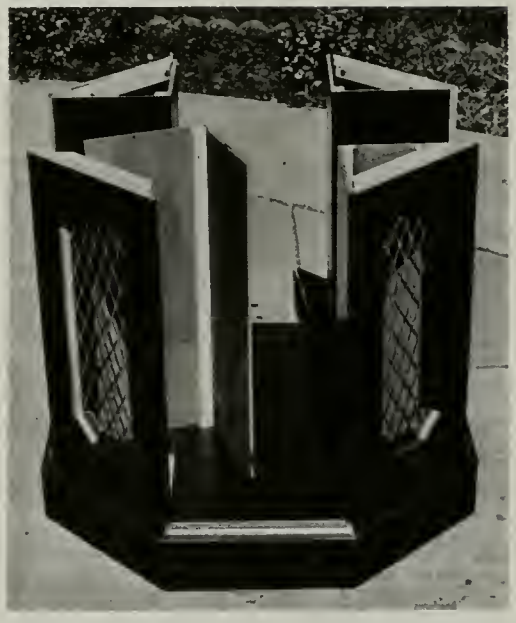
When taking measurements and cutting pieces bear in mind that the thickness of the material is ¾-inches and not ¼ or ½. This can be confusing to the unwary.

With the top and bottom cut, make the strips for the base and decorative panels. Cut these sections slightly oversize allowing for trimming after laminating. The best way to treat the panels is to cut the ½-inch part in one piece, adding the ¼-inch facing around the perimeter. The ¼-inch stock is mitered first and then laminated. This procedure makes for a structurally sound panel and saves material on the more expensive ¼-inch panel. Use white glue when laminating and for all assembly work.

The radial arm saw greatly simplifies the work of trimming and bevel cutting. Use a sharp blade and be sure to check bevels on scrap wood before cutting the work. When trimming the molding cut the longest pieces



*Strips of masking tape are used to hold the molding in place while glue dries. Center photo this page shows assembly of the molding around panel opening. Previously-installed grille is a backstop and assurance of perfect alignment. Partially assembled pieces are seen in the lower photograph. Note how diagonals are squared off on the inside. Before closing off the grilled sections interiors are painted flat black which contrasts well with polished brass of the grille itself. The cleats used throughout construction of the bookshelf-table not only eliminate the need for rabbets and dadoes but cut down on the tools required for woodworkers who possess only limited shops.*



first; thus if you make a mistake, you can re-cut for the next smaller size. An easy way to hold the moldings in place while the glue sets is to use masking tape, as shown.

It is helpful to install the metal grille before attaching the molding as it serves as a backstop for the molding and assures perfect line-up. The grille is held with screws and washers. Normally, if the wood needed finishing it would be necessary to remove the grille. Not so here, as no finishing is required.

Before closing off the grilled section paint the interior flat black. This will contrast nicely with the polished brass of the grille. Use screws and glue in the final assembly.

Maintenance is the same as for any fine piece of furniture. Use a good grade of furniture wax to clean the surface. Avoid abrasive cleaners which may scratch the finish. J.C.

*See also:* FURNITURE, INDOOR; POWER TOOLS; WOODWORKING.

# Lectern Bookcase

**This easy-to-build unit is just the thing for storing cumbersome reference books**

A SET OF ENCYCLOPEDIA, bulky dictionaries, and the large-size family bible are usually difficult to store, yet should be readily accessible when needed. This glide-about lectern bookcase is perfect for the home, school, or office. It's good-looking and practical, holds an encyclopedia set with space left over for other reference books. The lectern makes a handy reading shelf.

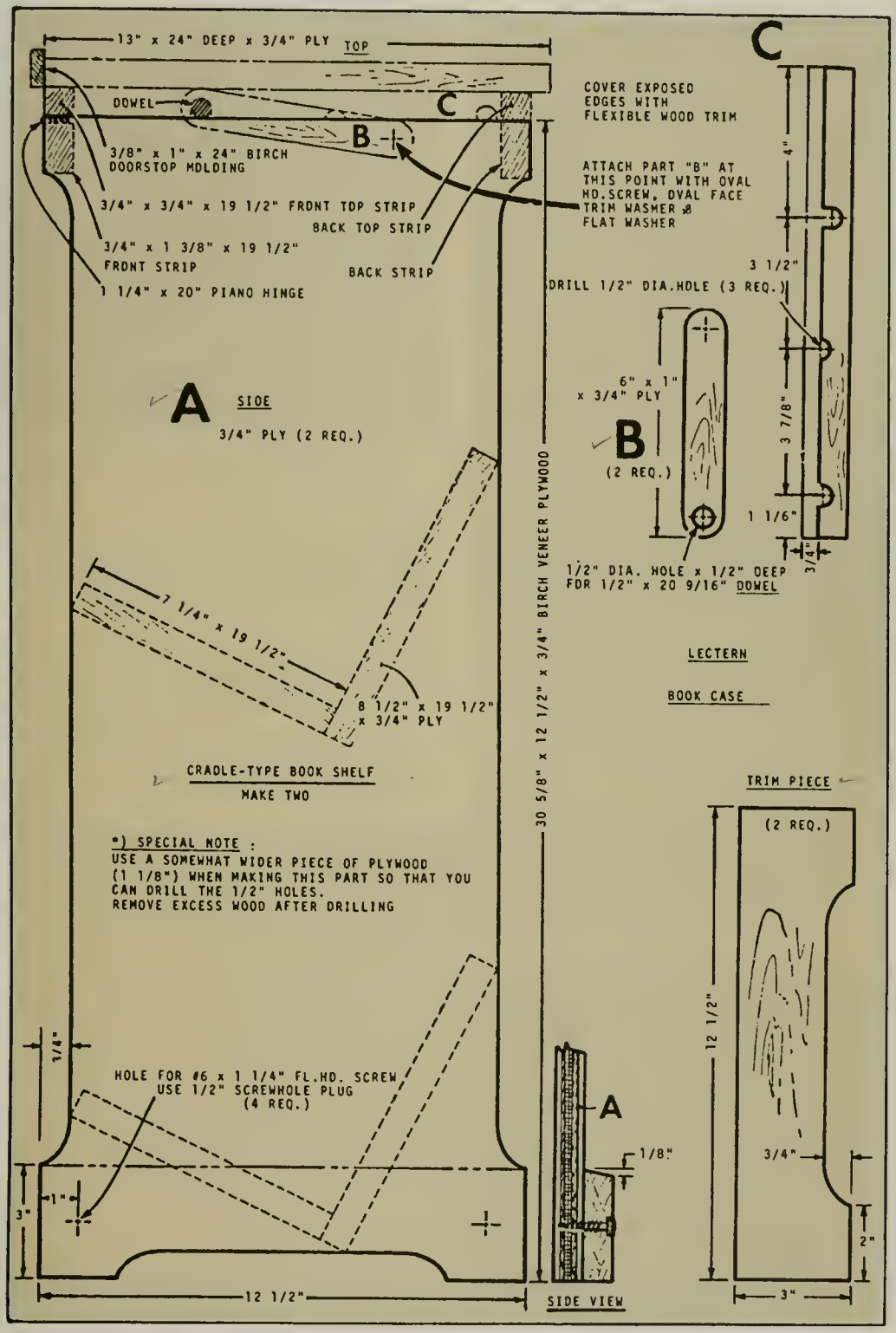
The unit is made of birch plywood, edged with matching veneer strips and a pair of solid birch "shoes" at the bottom. The shelves are tilted to hold books at an angle so that the titles are readily visible for selection. The reading shelf is tiltable to an angle that makes the cabinet comfortable to use. The unit rolls smoothly on ball-type casters, enabling it to be readily moved for ready reference.

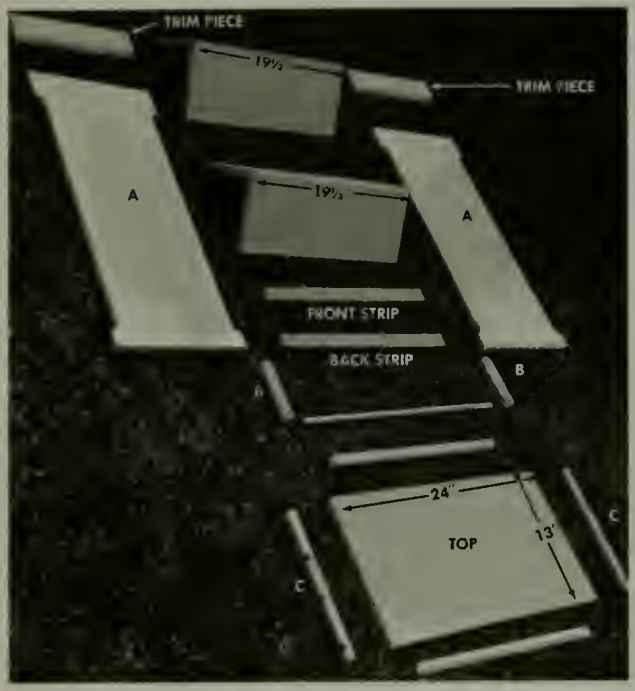
Only an easily handled four-foot-square plywood panel is needed as the main material for this project. Most lumber dealers now stock this half-panel size. The birch doorstop molding, edge trim veneer, and other materials are also easily purchased.

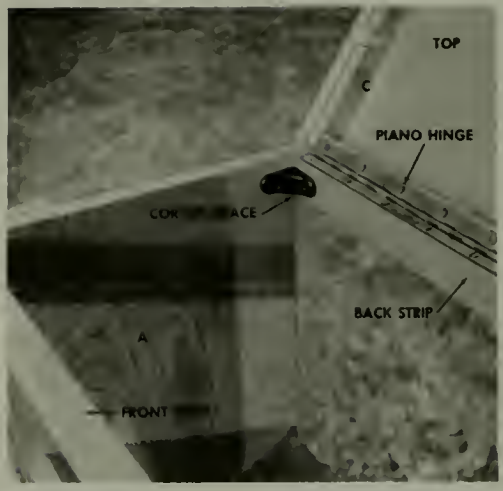
Start the project by cutting the two full-length sides from the birch panel, each 12½ inches wide and 30⅝ inches long. Shape the sides and bottom of these pieces as shown in the drawing, thus completing parts "A". Make the two "B" parts from plywood, each 1 inch x 6 inches, drilled to a depth of ½ inch for the dowel. Cut one piece of dowel, 29$^{9}/_{16}$ inches long. Form the two part "C" pieces as shown, each 12½ inches long, and drilled for three ½ inch rounded notches to receive the lectern support dowel.

The cradle-type shelves are 19½ inches wide, made of two parts. One is ¾ x 7¼ x 19½ inches, while the other part is 8½ x 19½ inches. The parts are joined with an overlap edge as shown in the drawing. The two shelves, of course, are the same dimensions.

The back and front top strips are also 19½ inches long, with each being ¾ inch square. The front and back lower strips are each ¾ x 1⅜ x 19½ inches. You will also need the top panel of ¾ inch plywood, which is 13 x 24 inches, and two trim


13" x 24" DEEP x 3/4" PLY TOP
DOWEL
3/8" x 1" x 24" BIRCH DOORSTOP MOLDING
3/4" x 3/4" x 19 1/2" FRONT TOP STRIP
BACK TOP STRIP
3/4" x 1 3/8" x 19 1/2" FRONT STRIP
BACK STRIP
1 1/4" x 20" PIANO HINGE
COVER EXPOSED EDGES WITH FLEXIBLE WOOD TRIM
ATTACH PART "B" AT THIS POINT WITH OVAL HD.SCREW, OVAL FACE TRIM WASHER & FLAT WASHER
A SIDE
3/4" PLY (2 REQ.)
7 1/4" x 19 1/2"
8 1/2" x 19 1/2" x 3/4" PLY
CRADLE-TYPE BOOK SHELF
MAKE TWO
*) SPECIAL NOTE :
USE A SOMEWHAT WIDER PIECE OF PLYWOOD (1 1/8") WHEN MAKING THIS PART SO THAT YOU CAN DRILL THE 1/2" HOLES.
REMOVE EXCESS WOOD AFTER DRILLING
HOLE FOR #6 x 1 1/4" FL.HD. SCREW USE 1/2" SCREWHOLE PLUG (4 REQ.)
1/4"
1"
3"
12 1/2"
30 5/8" x 12 1/2" x 3/4" BIRCH VENEER PLYWOOD
SIDE VIEW
A
1/8"
C
4"
3 1/2"
DRILL 1/2" DIA.HOLE (3 REQ.)
6" x 1" x 3/4" PLY
B
(2 REQ.)
3 7/8"
1 1/16"
3/4"
1/2" DIA. HOLE x 1/2" DEEP FOR 1/2" x 20 9/16" DOWEL
LECTERN
BOOK CASE
TRIM PIECE
(2 REQ.)
12 1/2"
3/4"
2"
3"




*Closeup shows details of cabinet assembly. Top is held with a piano hinge. Note metal brace at junction of back strip and side A.*

*All required parts for assembly of the bookcase are shown here. Check drawing and accompanying text for detailed description.*

pieces for the bottom, made from the birch doorstop molding, each piece 3 x 12½ inches.

Assemble the cradle-type shelves with glue and finishing nails. Cover the exposed edges with the flexible veneer trim. Join the two "A" sides to the shelves, which are placed at the indicated angles, using the #6 1¼-inch screws in countersunk holes so that the heads can be covered with wood plugs. Attach the front and back strips, reinforcing them with the metal corner

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 1 | ¾" 4'x4' birch veneer plywood | top, sides and shelves |
| 4 rolls | matching wood veneer strips | edgings |
| 1 | ½" 3' maple dowel | top |
| 1 | ⅜" 1¼"x24" birch doorstop molding | top |
| 4 | ½" screwhole plugs | sides |
| 1 | 1¼"x20" piano hinge and screws | top |
| 4 | #6 1¼" flathead wood screws | trim |
| 2 | #8 1¼" oval head screws and washers | |
| 2 | dome-faced trim washers | |
| 2 | corner braces and screws | |
| 1 set | 1½" ball type casters | |

**NOTE:** Also need, 3d, 5d, and 6d finishing nails, glue, sandpaper, cement, wood filler and finishing coat.

braces. Finish off all exposed plywood edges with the wood tape.

Attach the bottom birch trim to the side pieces, and shape the cutout contour. The "C" parts are attached to the edges of the top, and ¾ x ¾-inch strips fitted between these C pieces, are also attached to the top. The top is fitted to the basic cabinet with the 1¼ x 20-inch piano hinge.

Trim the back edge of top with the 1¼ inches doorstop molding so that the surface projection serves as a ledge to hold the book in place. The "B" parts are attached to the bookshelf sides with dome screws and washers, so that the top lifts like a lid. The ½-inch dowel is first set in between the two "B" parts before brackets are attached.

With the brackets in place, the top will be supported in any of three positions when raised, because the dowel will fit into any of the slots of Part C. When you want to lower the top so that it rests flat on the bookcase sides, just release the dowel retainer and swing it backward where it will be kept out of sight.

Upend the entire bookcase to install the casters, which should have screw-in stems. Just drill a pilot hole somewhat smaller than the stem diameter to install the casters, but be careful about splitting the wood if the hole is too small.

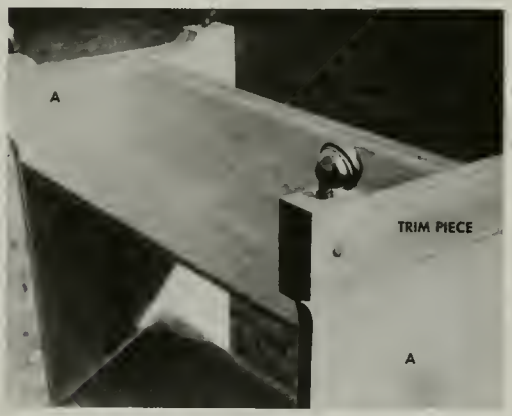
This completes the entire assembly. All exposed edges of the plywood are to be trimmed with the flexible veneer strips. Finally, sand down the entire surface with fine-grit paper to remove surface fibers and finger marks, and apply a coat of finish which retains the natural wood color and provides a satin, semi-gloss surface.

*Original design by Steve Ellingson.*

*See also:* HAND TOOLS; POWER TOOLS; FURNITURE, INDOOR.

*Lectern is supported at desired angle by adjustable dowel-bracket B, which fits into one of three slots cut into part C, as shown.*

*Another view of lectern support shows how neatly the parts are fitted. The dowel bracket swings back to permit closing top.*




*Ball-type Shepherd casters are easily fitted into drilled pilot holes in trim piece because of their threaded stems, as shown.*

# Build a TV Cabinet-bookcase

## Dowels and birch strips form decorative screen in this dual-purpose unit

PORTABLE TV sets, with their slim design, are a great improvement over the bulkier models of the past. Many current models are less than a foot thick.

Thus, possibilities have opened up for incorporating the TV into handsome cabinets like the attractive unit shown here. Made with birch plywood, the unit also serves the double purpose of being a bookcase.

Mounted on easy-roll ball-type casters, the cabinet can be turned in any direction for comfortable viewing, and just as easily rolled back against a wall again later. When open, the doors are only 12 inches wide and fold back out of the way; when closed, their unique slat arrangement provides a very intriguing filigree effect.

Construction of this cabinet can be successfully accomplished by any homeowner possessing just a moderate skill in woodworking and access to use of a table saw. Details and dimensions are clearly shown in the sketch, with the parts coded by letters for added simplicity. All you have to keep in mind is that the parts must be cut truly square so that they will join properly.

Start by cutting the parts, A through F, needed to assemble the basic cabinet. The A sides, each 16¼ x 34½ inches, are each shaped along the front edge to a depth of ½ inch near the bottom end, plus a recess of 1 inch at the level of the TV section. Place these sides with the best surface outward before shaping the front edge, so that you have the selected birch surface on the outside of the cabinet.

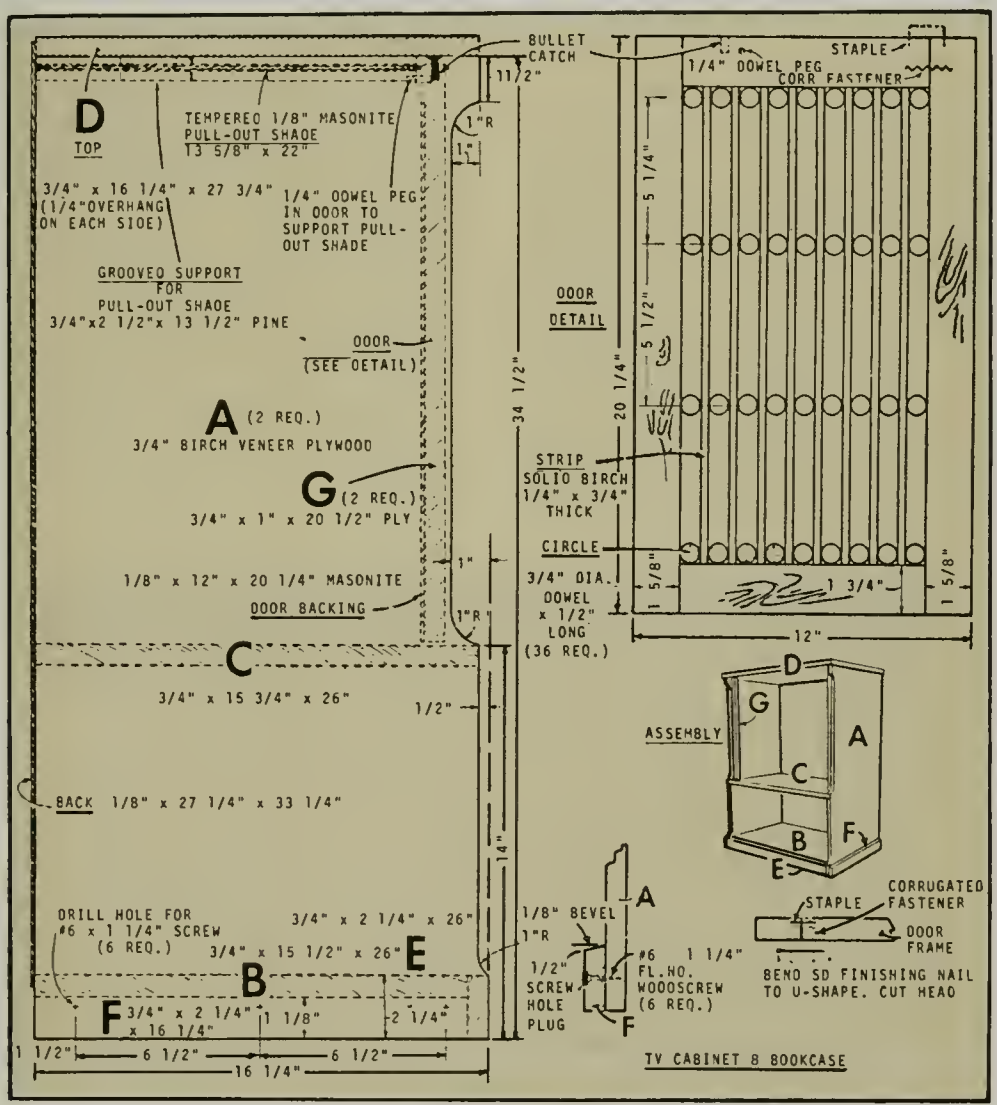
Part B is the bottom shelf, 15½ x 26 inch, and Part C is the middle shelf, 15¾ x 26 inch. Part D is the top, 16¼ x 27¾ inches. The top part is longer than the shelves because it extends over the ends of the A sides to overhang about ¼ inch on each end.

Assemble the cabinet with counterset finishing nails and glue, joining the sides to shelves B and C, and the top. Make sure that the shelves are perfectly level, at uni-

form positions, and that the assembly is square before the glue sets. Use pipe clamps for gluing pressure.

Cut Part E to fit in front of the lower shelf, between the sides. Cover the top edge of the plywood grain with flexible veneer and insert in place. Cut the two G parts and attach in place on the inner sides between A and D, to serve as the anchor plate for the door hinges. Cut the two base shoe parts (F) to 2¼ x 16¼ inch size, and chamfer the top edge to make a neat bevel that reduces the appearance of thickness. The F parts are attached along the bottom of the cabinet sides with glue and #6 1¼-inch woodscrews in countersunk pilot holes so that the screwheads can be completely concealed with screwhole plugs.

All remaining exposed plywood edges are trimmed with flexible veneer strips. Attach the hardboard back, cut to 27¼ x 33¼ inch size, so that along the top and sides it comes to within ⅛ inch of the edge. Attach with glue and 2d nails. Drill holes


D
TOP
TEMPERED 1/8" MASONITE PULL-OUT SHADE 13 5/8" x 22"
3/4" x 16 1/4" x 27 3/4" (1/4" OVERHANG ON EACH SIDE)
1/4" DOWEL PEG IN DOOR TO SUPPORT PULL-OUT SHADE
GROOVED SUPPORT FOR PULL-OUT SHADE 3/4"x2 1/2"x 13 1/2" PINE
DOOR (SEE DETAIL)
A (2 REQ.) 3/4" BIRCH VENEER PLYWOOD
G (2 REQ.) 3/4" x 1" x 20 1/2" PLY
1/8" x 12" x 20 1/4" MASONITE DOOR BACKING
C 3/4" x 15 3/4" x 26"
BACK 1/8" x 27 1/4" x 33 1/4"
DRILL HOLE FOR #6 x 1 1/4" SCREW (6 REQ.)
3/4" x 2 1/4" x 26"
3/4" x 15 1/2" x 26"
E
B
F 3/4" x 2 1/4" x 16 1/4"
1 1/8"
2 1/4"
1 1/2"
6 1/2"
6 1/2"
16 1/4"
11 1/2"
1"R
1"
34 1/2"
14"
1/2"
BULLET CATCH
STAPLE
1/4" DOWEL PEG CORR FASTENER
5 1/4"
5 1/2"
20 1/4"
DOOR DETAIL
STRIP SOLID BIRCH 1/4" x 3/4" THICK
CIRCLE
3/4" DIA. DOWEL x 1/2" LONG (36 REQ.)
1 5/8"
1 3/4"
12"
ASSEMBLY
1/8" BEVEL
#6 1 1/4" FL.HD. WOODSCREW (6 REQ.)
1/2" SCREW HOLE PLUG
CORRUGATED FASTENER
DOOR FRAME
BEND 5D FINISHING NAIL TO U-SHAPE. CUT HEAD
TV CABINET & BOOKCASE

in the bottom for the set of Shepherd casters.

The cabinet doors are a bit more complex to make, but the process is very interesting. First, cut the four frame parts for each door, the vertical parts to be 1⅝ inches wide, and the horizontal stretchers 1¾ inches wide, to make a frame 12 x 20¼ inches, as shown on plan. Join the frame together with corrugated fasteners at the back. To pull the corner joints of the frame together, use staples made by cutting the heads off eight 5d finishing nails. Bend the nails into the staple shape, drill undersize pilot holes at the ends of the joints, and drive the staples while the parts are locked together with a pipe clamp. Cut and attach a backing of ⅛-inch hardboard to each of the doors.

The door frame assembly is fully detailed in the sketch, as is the decorative slat construction.

First slice a number of ½-inch long pieces from the ¾-inch dowel. You'll actually need 72 of these circular sections. The separator strips are ¼-inch thick, ripped from your piece of solid birch. These vertical strips will be cut to the required length to fit the inside opening of the door frame. Place four of the circular sections, uniformly spaced, along a side of the frame, and cut a strip to fit against them. Apply slow-setting glue.

Continue to arrange the parts in rows, alternating strips and dowel pieces and making eight strips in each door. If there is a slightly tight fit, you can trim down the dowel pieces a bit so that they all fit neatly.

The completed doors are fitted with cabinet "bullet" catches at the top edge. If you want a pull-out shade above the TV set, cut one from ⅛-inch hardboard, making it 13⅜ x 22 inches in size as per plan. Drill a 1½-inch finger hole at the center, about ½ inch in from the front edge, for a finger grip. Put in a dowel peg on the back of each door to hold the shade when the doors are open.

The rest of the job is a matter of mounting the doors with the selected cabinet hinges, and attaching the door pulls. Then, sand and finish for a happy completion of the job.

*Original design by Steve Ellingson.*

*See also:* HAND TOOLS; POWER TOOLS; FURNITURE, INDOOR.

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 1 | ¾" 4'x8' birch-veneered plywood | basic unit |
| 1 | ¾" 6"x18" solid birch | door strips |
| 6 rolls | ¾" flexible wood trim veneer, matching wood color | |
| 1 | ¾"x36" hardwood dowel | |
| 6 | ½" hardwood screw hole plugs | |
| 1 | ⅛" 4'x8' tempered hardboard | TV shade, back, doors |
| 4 | 1½" Shepherd casters, screw-in type | |
| as needed | #6 1¼" flathead wood screws | |
| 8 | ½" corrugated fasteners | doors |

**NOTE:** Also need, finishing nails, wire brads, wood filler, glue, sandpaper, finish coating and hardware.

# Make Your Own Glassware

**Instead of throwing empty bottles out, you can use a kit to convert them into picturesque, useful articles of glass**

YOU CAN MAKE useful glassware out of empty bottles that would ordinarily be discarded. To do this you need a bottle cutting kit, some epoxy adhesive and some bottles. Almost any kind will do—beer, wine, soda, etc.—as long as they are round.

One kit uses a regular glass cutter attached to a few support aligning arms made of aluminum. After assembling the tool, select a bottle by deciding in advance what you want to make. Soda bottles are good for making drinking glasses. A wine bottle makes a fine chalice, especially when it has an indented bottom. Half-gallon jugs are good for kitchen jars; gallon jugs make decorative planters.

*Before making the cut,* wash the bottle and decide just where the scribe will be made. If the bottle contained imported wine, you may want to save the label and cut above it, otherwise remove the label. Never move the cutter through paper or an embossed section of glass.

Proper adjustment of the cutting jig is essential. The vertical arm *must* be absolutely straight while the cutting wheel is just touching the bottle wall. To cut, lift the bottle and jig off the table. Press the cutter firmly against the bottle with one hand while gripping the bottle firmly with the other. Do not attempt to move the cutter. Instead, twist the bottle around. Make sure there is a clean score all the way around. If necessary go back and cut those sections missed after the first pass. For longer cutter life, oil the cutting wheel before each cut. Also, do not go over any sections already scored.

After you are satisfied that there is a nice even cut all the way around the bottle put aside the cutting jig and pick up the tapper for the most critical part of the job. Place the tapper rod inside the bottle and adjust the height so the small washers at the bottom of the rod are aligned exactly with the cut. Too high or too low a setting will cause shattering or cracking when the tapping begins. Use a rocking motion while tapping lightly. Always swing the tapper in the same direction (away from you), while slowly twisting the bottle around. Keep the bottle moving. On the first turn you will be setting the cut. That is, the glass is given the direction of the eventual split.

*As you tap and turn* the bottle resist the temptation to hit harder because nothing appears to be happening. Do not dwell in one spot until a visible crack appears. Maintain a steady rhythm of tapping and twisting. You will see the crack growing as

**brakes, disc:** see disc brakes
**brakes, drum:** see drum brake service
**brakes, hydraulic:** see hydraulics
**brakes, power:** see drum brake service
**break-front china cabinet:** see china cabinet

you do. When you hear the sound of the tapping change from a tinkle to a dull thud, the split is complete. Remove the tapper and lift the bottle top from its bottom section.

Though the cut may be clean, the edges of the two sections are sharp enough to injure you. Grinding requires some patience and a firm hand. Start with a #80 wet-or-dry paper. Lay the sheet on a flat surface, grit side up. Form a small water puddle in its center and press the edge to be ground against the paper. Use a twisting motion. Stop when the edge is smooth and dull.

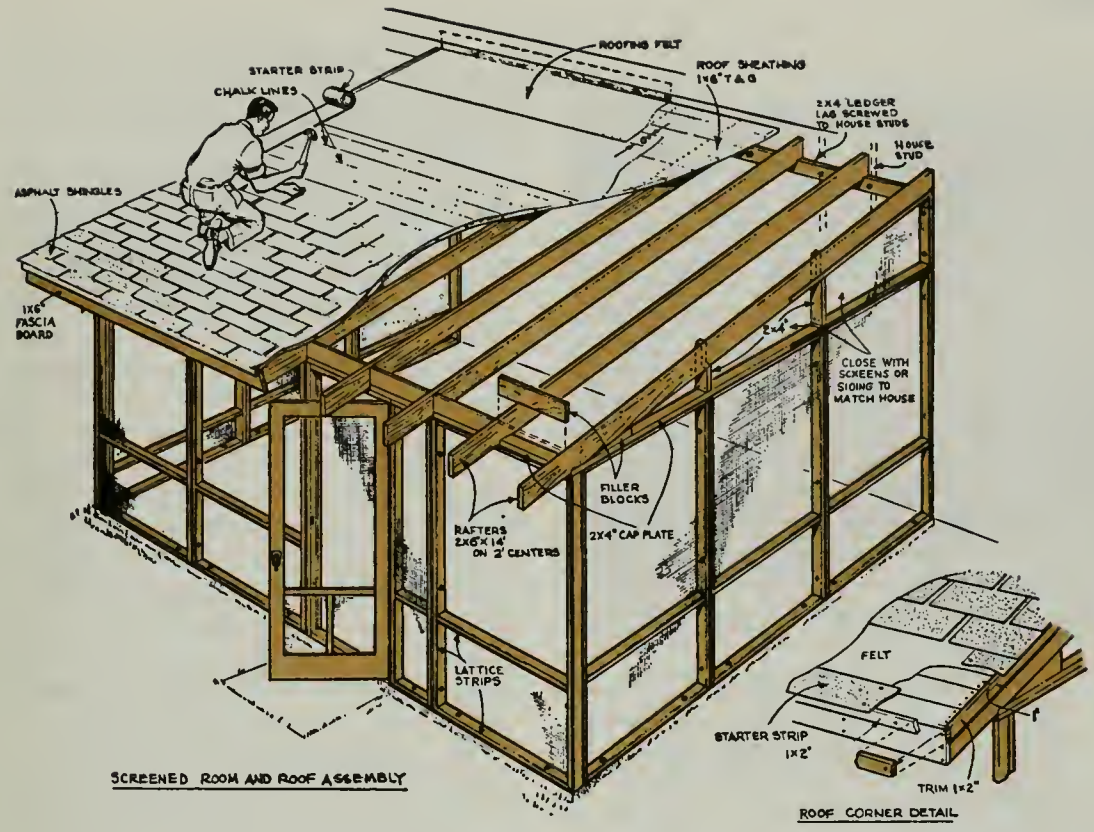
Some of you may want an edge that is very much like the ones found on fine crystalware. This is possible but it takes a lot of work and a lot of paper (35-50¢ per sheet). You will find that the finished object retains a nice rough and "campy" feeling if the edges are ground deep enough to be dull and safe, but not deep enough to give that machine-polished look. When the edges are ground to your satisfaction on the #80 paper, repeat the twisting motion with #320 wet-or-dry paper for finishing. Remember, in both cases, you always work wet.

*All these glass objects were cut from bottles. To cut a bottle, simply rotate it against the cutter (right) scoring a line around the outside where you want the bottle to break. Use the tapper (inset) to tap from the inside all along the scored line until the bottle breaks. Then, dull the sharp edges with an abrasive. Chalice was formed by using epoxy adhesive to join two pieces of bottles.*

*The technique given here* will work on any size bottle. For those jugs with a wide neck, you will have to switch to a larger sized washer on top of the cutting jig. The bottles must be round for best results. Square bottles do not seem to lend themselves to this process. However, if you can succeed in giving them a deep, even score you can try an old-time glazier's trick for making the break at the cut. Gently revolve the bottle over a candle flame. Make sure that the heat penetrates the score line. Try keeping the heat even all the way around the bottle. After the cut feels too hot to touch, apply an ice cube all the way around, listening for the cracking sounds.

In this day and age it is not likely that you will run out of empties. They should keep your cutter and your habit well supplied until you can qualify as an expert. There are some people who are selling finished mugs and chalices to gift shops. Others are preparing for the holidays. So, if there are too many empty bottles around your house—cut them up and enjoy the results. S.J.

*See also:* ABRASIVES; ADHESIVES.




*Breezeway enclosed with modular screen panels makes outdoor living a real pleasure for the whole family. Wide lattice gives panels a flush appearance.*

# Screen Your Patio or Breezeway

**You can build modular screens or privacy panels to create a sheltered outdoor leisure area and increase the value of your home**

YOUR FAMILY CAN ENJOY a comfortable, mosquito-free outdoor living room for about $60 worth of materials if your home now sports a breezeway. And you can install the same hot weather luxury in a covered porch or patio as large as 12 x 16 feet for around $90, thanks to modular screen panels of simplified, sturdy construction.

You can assemble the large panels now in your basement or garage to have them ready for quick installation when the first warm days arrive. The 4 x 7-foot screen panel will average about $7.50 for materials; a privacy panel, substituting hardboard for most of the screening, about $9 and a door panel, complete with screen door and hardware, about $20. Six panels will do the job for most breezeways; nine or ten for most patio porch areas. You can lop off $1 per panel if you use galvanized instead of *Fiberglas* or aluminum screening, but maintenance cost will be higher.

If your patio is roofless, you can erect a top custom-designed to fit the panels. Even if you have no patio at all, here is how to do the whole job.

**breezeway walls:** see home improvement
**brick floors:** see floors, brick
**bricklaying:** see brickwork
**brick walks:** see brickwork

▲ *Screening is attached with ½-inch long staples across the top, then down the sides. Wire is pulled taut as work progresses but not tight enough to form scallops along edges. Scrap framing pieces underneath help hold up wire in center of span.*

*Plan your area first* by laying out a scale plan on graph paper. Divide the perimeter into 4-foot modules or a size to fit your area. Locate door position and indicate which panels are to be open and those to be closed for privacy or protection from wind and weather. Now you can work out the number of panels required and estimate the lumber needed from the Materials List.

If you have an existing porch or breezeway to be screened, modify the 7-foot panel height as necessary to complete the enclosure. If possible, hand pick the standard 2 x 3-inch lumber (actual dressed size 1⅝ x 2⅝ inch) that is relatively free of twists and crowns. Your dealer will precut it to lengths you specify if you desire.

*Building panel frames.* As you build each modular unit, arrange the long side pieces so that any slight crown existing will always be on the outside. Begin by nailing two long sides to two end members with 20d rosin-coated nails. To reduce the likelihood of splitting, it's a good idea to drill lead holes for the nails.

In the screen panels, next nail the chair rail crosspiece in place. Check frame for squareness by measuring diagonally from corner to corner and adjusting unit until measurements are equal. Nail temporary braces diagonally at inside top of the unit. Screw fasten 1 x 6-inch flat corner angles in place at each corner joint.

A standard screen door will fit in the 4 x 7-foot modular panel with a slight change in framing (see Materials List) and addition of two more flat corner angles.

Each privacy panel requires two crosspieces and should be diagonally braced until after it has been screened and the ⅛-inch tempered hardboard attached. No flat corner angles are needed since the hardboard gives the panels enough rigidity.

The completed frames are now ready for painting. Start with a good outside undercoat, followed by one or two finish coats of an exterior non-chalking paint in the color you desire. It is a good idea to prepaint the lattice strips now, but save the cutting for later. Where they will differ in color, such as dark framing with white trim, use 1⅛-inch wide lattice. For a flush look use 1¾-inch wide lattice and rip it to 1⅝-inches to match actual width of the 2 x 3s.

*Applying screening.* After the paint dries, roll 48-inch wide screening over a frame and cut length to overlap inside edges of the frame at least 1 inch on top and bottom. Starting across the top member, then along the sides, staple screening every 3 inches. Align the same screen thread along the frame edge to insure a neat square job. A stapling gun is best for this job and can usually be rented from your local hardware or building supply dealer. Several short 2 x 3s placed inside the frame will help hold the screen up while stapling. Run a bead of water-resistant glue along the screen edges covering the staples and allow it to dry. This will add little fingers to grip

the screening in each opening which will help prevent pulling out between the staples. Turn edges of the screening and staple again through both thicknesses.

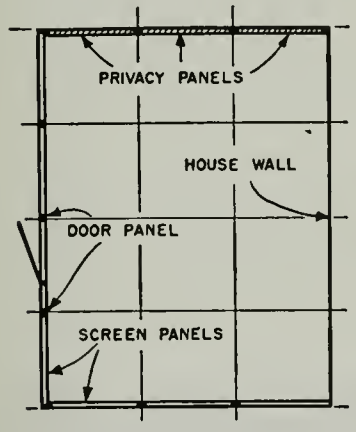
Attach the lattice strips with 4d or smaller aluminum or galvanized nails. You will need but little lattice on the privacy panel units since the hardboard will cover a large portion of the side members as well as the two inner crosspieces. With the screening complete, add the tempered hardboard or exterior plywood, nailing it in place with aluminum or galvanized nails.

Stand the panels up in your basement or garage and clamp together two at a time to drill for bolts and lag screws. Key each two joining panels to simplify the final assembly.

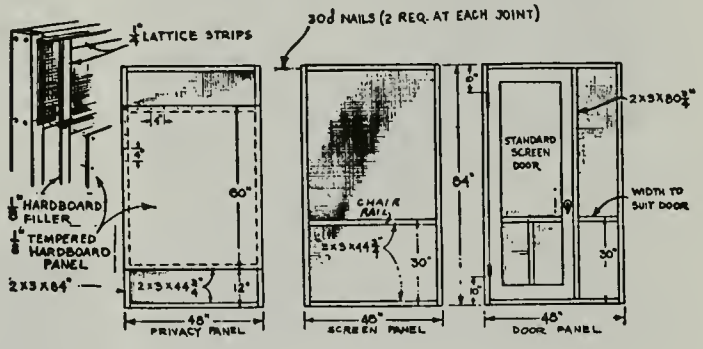
Note that in the simple corner one panel is simply lag-screwed to the other. For a sturdier corner, you can install an additional 2 x 3 or 3 x 3 member 7 feet long and fasten both units to it with lag screws.

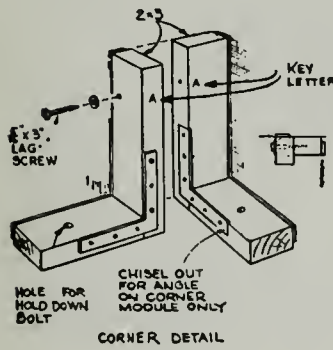
If screening an existing porch or patio area, be sure to check the slope of the slab with a carpenter's level, then make tapered strips to level up the bottom of the modular screen panels. A carbide-tipped masonry bit in a low-speed (800 rpm) portable electric drill will make short work of drilling the holes in masonry. Lag-screw through the wood members into lead sleeves inserted in the drilled holes for hold-down fastenings. Plan two hold-down screws for each panel. On wooden decks or porches use #12 x 3-inch wood screws through the bottom frame members.

*Patio floor.* If you're starting from scratch, accurately lay out the area to be covered by your patio. To make sure your rectangle is square at corners, use the 3-4-5 triangle principle. Measure 3 feet along one side, 4 feet along another. The angling

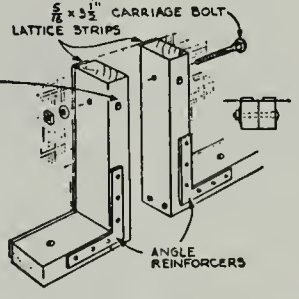



TYPICAL PATIO PLAN FOR 12 X 16' AREA (4' SQS)

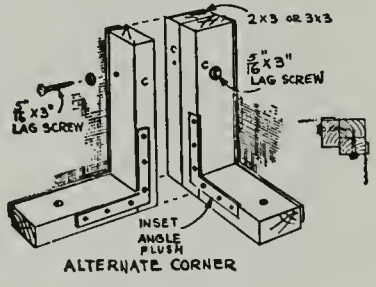



CORNER DETAIL




PANEL JOINT DETAIL




ALTERNATE CORNER

*After glue dries on first line of staples, screening is folded back and a second line of staples added between original fastenings.*

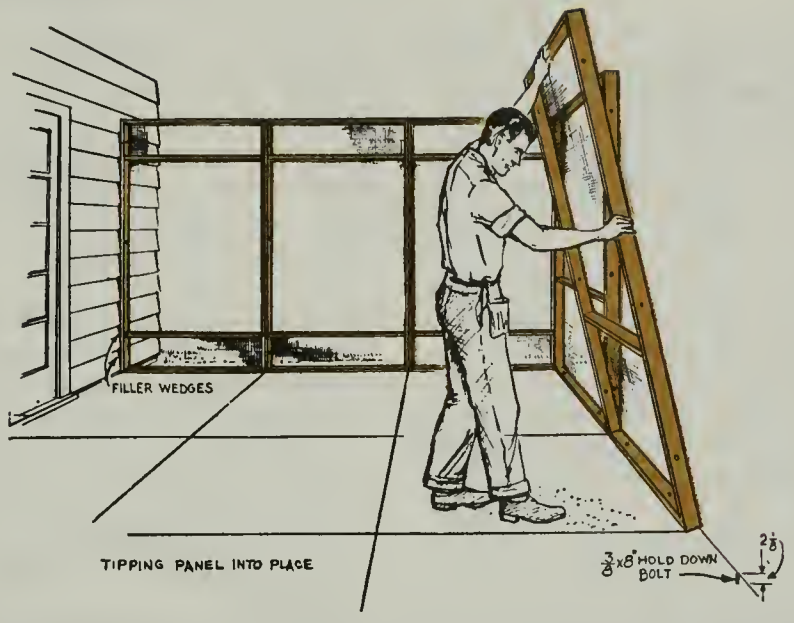
*Lattice strips are tacked in place with short finishing or casing nails so that they overlap at corners (above). Saw miters both pieces at the same time as cardboard scrap underneath protects frame from saw teeth. At right, with cut completed and cardboard removed, remainder of strips are attached. Key joining panels.*

side or hypotenuse should measure 5 feet. Multiples such as 6-8-10 may be even more accurate. As a check, measure the diagonals of the completed rectangle. If they are equal, the rectangle will be square.

Use string lines to help establish the corners. Once they are set, build batter boards around the outer corners and hang string lines across alignment marks with weights to keep lines taut. With string lines in place, you can dig the footing and build forms without losing the corner locations. Batter board can be leveled with a string line and line level.

Set the concrete slab a step below the house floor, or on the same level if the house is also built on a slab. Where winter freezes are only moderate, you can build a floating slab with only a thickened outer edge. Where ground freezes solid, a footing extending below the frost line along exposed edges will keep the slab from cracking. Measure depth of trench from the taut string line.

This footing can be poured at the same time as the slab surface. Dig the trench 8 inches wide and erect forms around the top edge only, both inside and outside. The inside forms hold the material in place and are covered with concrete. For the thick-




edge slab, lay out the patio area and set up 2 x 6 forms.

Dig out the slab area 8 inches below the surface, then add a 4-inch layer of crushed rock or coarse gravel and tamp it well. Cover this loose fill with tar paper or a plastic film to keep moisture in concrete from soaking into the ground. If your house siding is wood, staple a double layer of tar paper along the bottom or flash this area with sheet copper. Otherwise, moisture from the concrete will rot the siding in a few years.

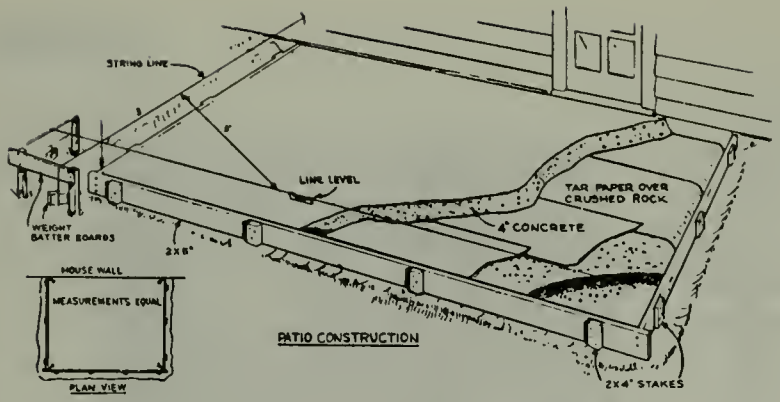
You can save yourself a lot of work, using ready-mixed concrete delivered directly to your forms, which costs no more than mixing it yourself. Wet down forms well before pouring so they will not absorb water from the concrete. For a stronger, less-likely-to-crack patio floor, stop the pour at the halfway point long enough to lay down some reinforcing wire mesh or reinforcing bars (available at building supply houses).

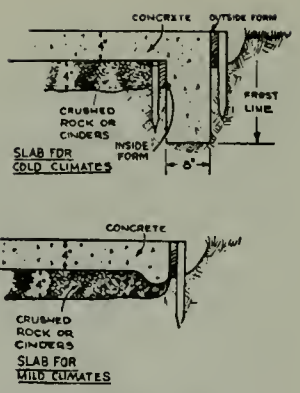
After finishing the pour, strike off concrete level with the top of the forms, using a straight-edged 2 x 4. Follow with a wood float for a rough surface or steel trowel for smooth. Now install ⅜ x 8-inch bolts along the slab edges with threads protruding about 2⅛ inches above the surface; two for each screen panel.

You'll have harder concrete if you don't let the sun dry it too fast. As soon as the top is hard enough, cover with a tarpaulin, or use burlap, canvas or kraft paper. Leave forms in about 10 days, or until concrete is hard.

*Panel installation.* Set up the first panel against the house making certain it is vertical. Locate and drill holes for the hold-down bolts, then lag-screw the panel to the house. If the wall is masonry, use a masonry bit to drill holes for lead sleeves. When fastening to beveled siding, plan to fill in the small gaps later with wedge pieces. Continue around edge of the patio fitting on hold-down bolts and bolting panels together. When erecting the door panel be careful not to force it out of square.

*Roof framing.* When all panels are up, turn your attention to the patio roof framing. If it will begin along a frame wall, secure a 2 x 4 ledger to the outside of the house. Use ⅜ x 4-inch lag screws to reach

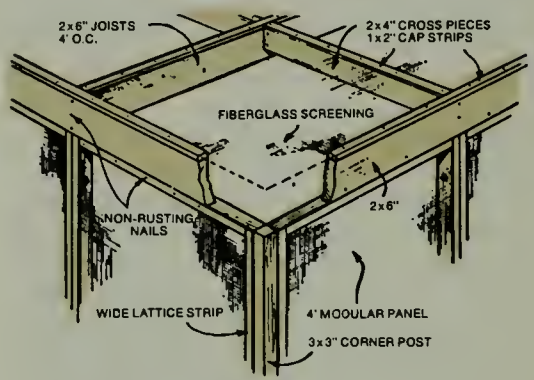


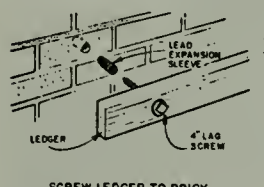

the wall studs. Rafters rest on ledger and slope down to the outer patio wall.

If the siding is brick, install a ledger with lead sleeves and lag screws. For a roof beginning at a boxed cave remove the fascia board to nail rafters on ends of the house rafters. If your roof will end on the house roof, remove necessary shingles and nail longer rafters through the roof into the house rafters. Cut the first rafter to find length and slope of the ends by trial and error, then cut other rafters to match. When extending a flat roof beyond an overhanging roof, run rafters to the side wall and add a filler.

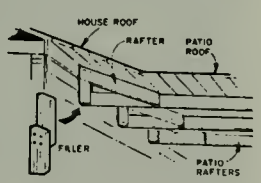
Cut 2 x 6 rafters to fit the roofing method selected. Nail a 2 x 4 cap plate along tops of the screen panels, then hold the first rafter in place against the side of the framing to mark notches for the ledger and outer wall cap plate. Cut notches, then use this rafter as a template to mark and cut other rafters. Toenail rafters on 24-inch centers on ledger and at outer wall. Notch out short 2 x 4's to fit vertically at 4-foot



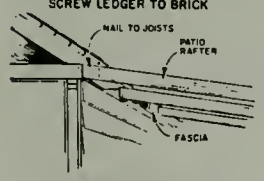

FLAT SCREENED ROOF DETAILS



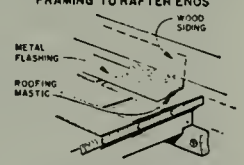

SCREW LEDGER TO BRICK



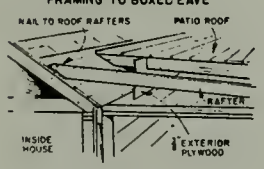

FRAMING TO RAFTER ENDS



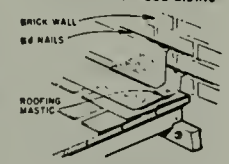

FRAMING TO BOXED EAVE




FLASHING TO WOOD SIDING




FRAMING TO ROOF




FLASHING TO BRICK WALL

intervals along half gable ends. Add filler blocks from 1 x 6-inch stock between rafters over the outer wall.

To complete the roof framing, add a 1 x 6 fascia across rafter ends, then start at the bottom and apply 1 x 6 tongue and groove sheathing over the rafters with 6d nails. Finally, cover edges of sheathing with 1 x 2 trim, butted at corners.

Roofing for a low sloping roof should include an underlayment of roofing felt followed by asphalt tab shingles or roll roofing. Before laying shingles, apply a starter strip around edges. Then nail tab shingles in place, six 1-inch shingle nails to each 3-tab shingle. Drive nails on each side and above notches between tabs and at ends.

*Sealing roof joints.* Use metal flashing

set in mastic compound for weatherproofing the joints. The simplest joint to seal is that between patio roof and wood siding. Remove nails or drive them through the siding with a nail set to slip metal flashing up under the siding. Replace nails through both siding and flashing, then apply roofing cement under lower lip of flashing.

Flashing a brick wall usually requires two strips—flashing and counterflashing. Chisel out about ¾-inch of mortar between bricks for the lower flashing, then insert one edge of the flashing into the joint and fill with mastic. Apply mastic under lip of flashing against the top of roofing. A few roofing nails may be nailed into roof where the counterflashing will cover them. Fit upper flashing into the next mortar line above the first flashing and hold with 6d nails. Seal the lower edge with more mastic.

When extending a roof line, loosen tabs of the existing shingles and slip starter strip under the lowest row of house shingles. Slip top of shingles for patio roof under the starter strip and replace nails through house shingles. Use small pieces of metal flashing to seal joint between patio sides and house roof.

*A flat screened roof* achieves an open-to-the-sun room. Space 2 x 6 rafters 48 inches apart and divide them with 2 x 4 crosspieces. Staple screening to the rafters and crosspieces, then cover with 1 x 2 wood strips. D.M.S.

*See also:* CONCRETE; LUMBER; ADDITIONS, HOME; HOME IMPROVEMENT; PATIOS.

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 2 | 2″ 3″x7′ side framing members | screen |
| 3 | 2″ 3″x44¾″ crosspiece framing members | screen |
| | ¼″ 1¼″x26′ lattice strip | screen |
| 4 | 1″ 6″x6″ flat corner angles | screen braces |
| | 48″x84″ Fiberglas screening | screen |
| 2 | 2″ 3″x7′ side framing members | door |
| 2 | 2″ 3″x44¾″ crosspiece framing members | door |
| 1 | 2″ 3″x80¾″ vertical framing member | door |
| 1 | 2″ 3″x24″ crosspiece | door |
| 1 | 32″x84″ screen door and hardware | door |
| | ¼″ 1¼″x20′ (maximum) lattice strip | door |
| 1 | ⅛″ 4′x6′ tempered hardboard | privacy panel and filler strips |
| 1 | ¼″ 4′x5′ A-B grade exterior plywood | privacy panel |
| 6 | 1″ 6″x6″ flat corner angles | door braces |
| | 48″x84″ Fiberglas screening | door |
| 2 | 2″ 3″x7′ side framing members | privacy panel |
| 4 | 2″ 3″x44¾″ crosspiece framing members | privacy panel |
| | ¼″ 1¼″x12′ lattice strip | privacy panel |
| | 26″x48″ Fiberglas screening | privacy panel |

**NOTE:** Also need, 20d nails, 5/16″x3″ carriage bolts with washers and nuts, 5/16″ x 3″ lag screws with washers, ⅜″x8″ hold-down bolts with washers and nuts, #10x1½″ wood screws for flat corner angles, lead sleeves for 5/16″-diameter lag screws, water resistant glue and paint.

*This combination porch wall and planter uses random stones for color contrast. See drawings for construction and method of filling the center of the wall, which becomes a planter 8 inches wide and 12 inches deep.*

# "Homescaping" with Bricks

## Use these photos, drawings and instructions to build walls, steps, patios, walks and planters

YOU DON'T HAVE TO BE a skilled mason to improve your home with decorative brick, stone or glazed tile.

The rules for doing good home masonry work are relatively simple. So are the tools and equipment required. And ideas for useful and colorful improvements are plentiful.

On this and succeeding pages, you'll find a selection of attractive masonry projects.

*What you'll need.* The most widely used common bricks measure 2½ x 3¾ x 8 inches. They are readily available at local building material yards, where you may also find other shapes, sizes, styles and textures of brick, cut stone and tiles.

In addition to the basic tools, you'll find either a metal wheelbarrow or a small mixing box helpful in preparing mortar and concrete mixes.

*Mixing the mortar.* The ideal mortar for strong brick work is a 1:1:6 mixture of 1 part Portland cement, 1 part lime and 6 parts sand. Use a small pail or box for measuring the ingredients. To prepare the mortar, first spread the sand in the box and then add the cement. Hoe these ingredients back and forth until a uniform color is obtained. Then spread on the lime and repeat the mixing process.

Add water gradually and hoe the mixture until the entire mass is soft and pliable. You have the proper consistency when the mortar oozes out from between the bricks without breaking away, and the bricks can be bedded in place with a light to medium tap of the trowel.

Try to mix only as much mortar as you can use up in about three hours, if the air temperature is around a normal 70°F. If the mixture hardens because of water evaporation, it can be re-tempered by adding more water and re-mixing.

*Basic bricklaying technique.* The step-by-step procedure in laying brick is shown in the accompanying drawings. Stretcher courses are laid one upon the other with the bricks flat and positioned end to end.

**buck board:** see boat building projects
**bullets:** see reloading
**bumper pool table:** see pool table
**bunk beds:** see beds
**burglar alarms:** see alarms, burglar

The patterns for both stretcher and header courses may be varied.

Another standard technique is that of angle-cutting bricks and laying them to form a sawtooth border.

*Brick walls and planters.* Before mixing your mortar, lay out the first course of brick to correspond with size of the wall or planter you are building, so as to come out with either full or half bricks at either end. Allow from ¼ to ½ inch for each joint, increasing or decreasing the spacing within this range so that you come out even with your planned dimensions.

Both brick walls and planters should rest on concrete footings at least half again as wide as the overall thickness of the work. For example, an 8-inch thick wall, 24 inches high, requires a footing 12 inches wide and about 5 inches thick.

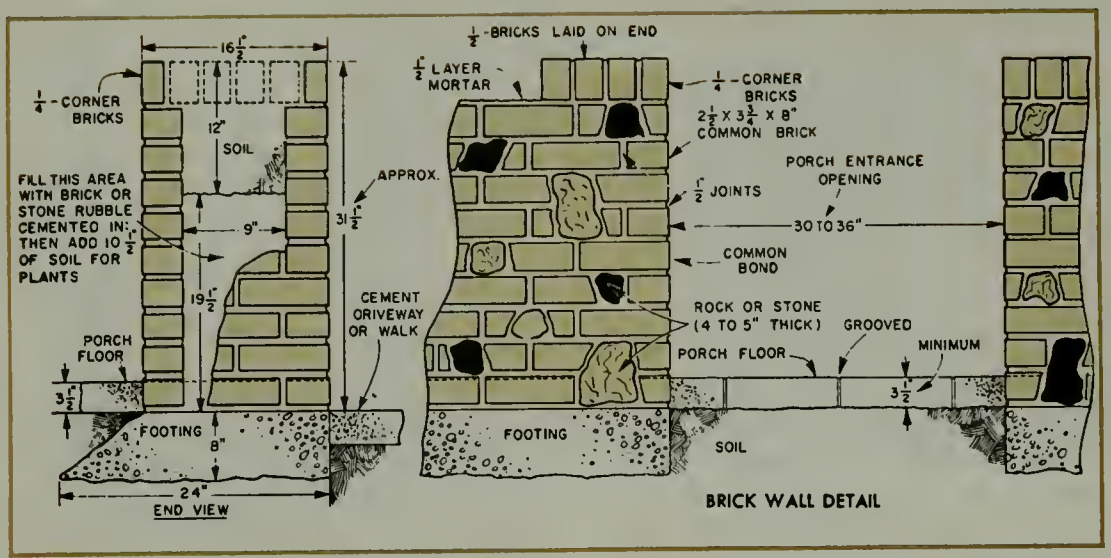
For each additional foot in height, add 1 inch to the thickness and 2 inches to the width of the footing. As a general rule, planters or walls of only one brick in thickness should not be more than 24 inches high.

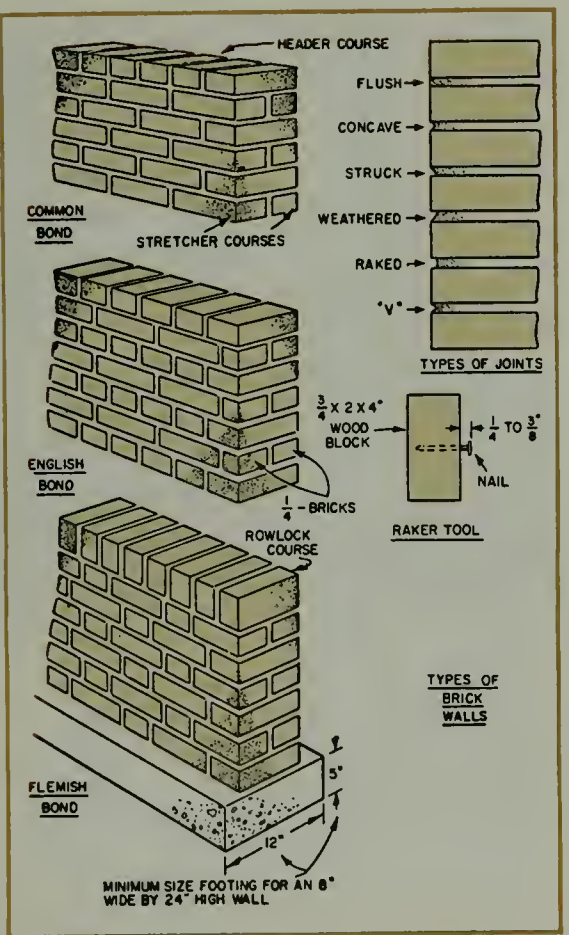
*Footing mix.* The proportions for a suitable mix for footings are 1:3:4 (1 part cement, 3 parts sand, 4 parts gravel). With a solid ground for the footing prepared at least 6 inches below frost line, pour the concrete mix in the forms in one operation. Your local building department can tell you the depth of the frost line.

For brickwork exposed to the weather, concave, weather or "V" joints shown are recommended. The concave or "V" joints are best made with a jointing tool. The pointing trowel is used for flush, struck or weathered joints. Raked joints can be made with a homemade raker; here the nail head removes the mortar to a uniform depth.

*Laying the wall.* Lay the end bricks first

*Ruffled bricks capped with glazed bricks form the combination tree and flower planter at left. Drawings show you how such a planter is constructed. Above, sawtooth-set bricks form a planter bordering a basket-weave style brick walk. The brick steps are topped with red-colored concrete. The powdered coloring is available at building supply yards.*




on a ½-inch bed of mortar. Then stretch a taut line aligned with the upper, outside corners of the end bricks, to serve as a guide for laying the remaining bricks in the course on a straight line.

Immerse each brick in a pail of water for one or two seconds before laying it; if you don't do this the dry brick will draw moisture from the mortar, resulting in a weak bond. Don't move a brick once the mortar has begun to set; it will produce a weak joint. If you have to reposition the brick, remove it, clean off the mortar, and re-lay the brick with new mortar which is still pliable.

As each course is laid, make sure the end bricks are all the same height from the footing, and aligned plumb with the brick below. After every third or fourth course, stop to tool all the recently-laid joints before the mortar hardens.

If you are building an 8-inch thick wall fairly high, so that two stretcher courses will be laid side by side using a common bond, be sure to top every fifth or sixth stretcher course with a header course, to keep the wall intact.

*Planter combination.* The specifications for the combination tree and flower planter

are detailed in the drawings. For the stretcher course design, you'll need 32 bricks; for the soldier course design, 46 bricks. Each design is topped with 16 glazed bricks. The top edge of the wooden tree box (which has no bottom) is installed on a level with the glazed brick. Fill the outer (flower) area with soil up to 1 inch from the top; fill the box for the tree to within 5 inches from the top.

*Porch steps.* If you want to build brick steps, note the construction details in the appropriate drawing. Use the two-step design for porch floors 18 inches above grade level, or where you are allowed to fill in or remove the soil to the 18-inch level. This allows a 6-inch rise for the steps.

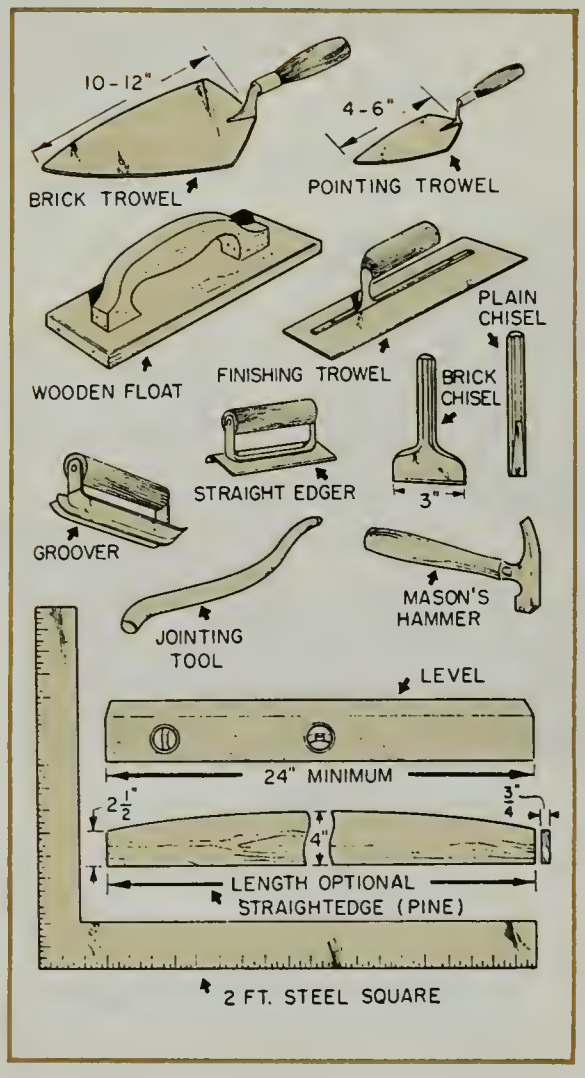
Install the footing forms. Allow ⅛-inch pitch per foot so step treads will drain properly. Pour in the same 1:3:4 footing mix specified earlier for wall footings. You can remove the forms in 24 hours and then lay the first two courses of brick. After the mortar hardens, fill with soil compacted to within 1 inch from the top of the bricks. Then add a 1-inch thick layer of concrete far enough back to form a footing for the second step or next two courses of brick. Add the soil and concrete fill as you did for the first step.

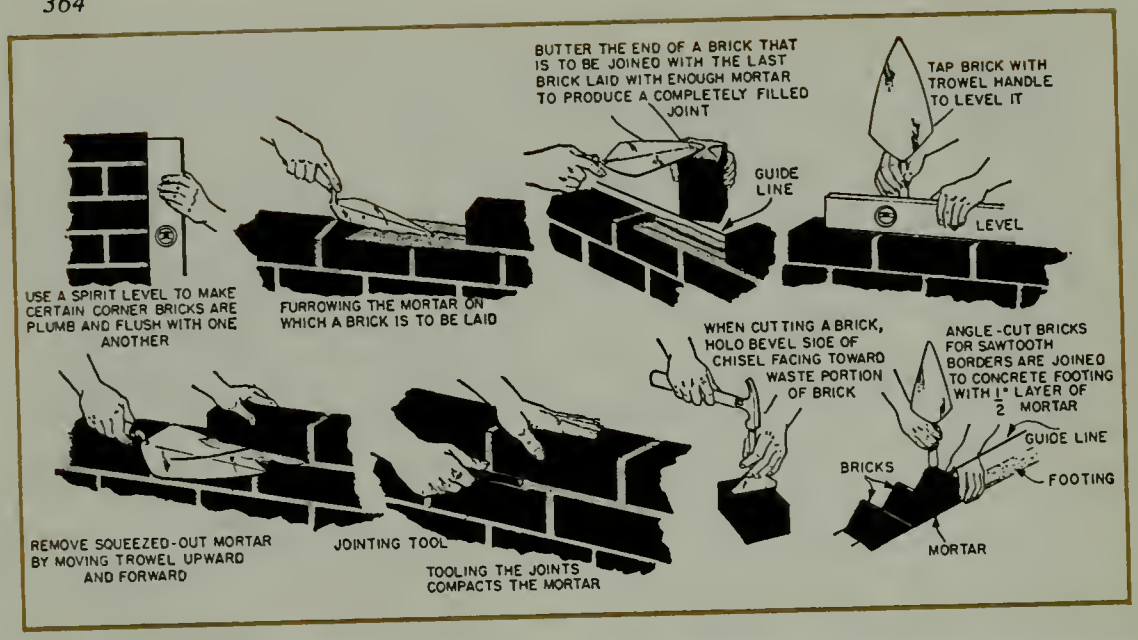
To make the colored concrete topping used on each step, you'll need the form setup shown in the drawings. Note arrangement of overhang supports; this allows the sideboards to be removed without disturbing the support boards when finishing the topping.

Seal the openings between the bricks and overhang supports with a cement and water paste; let this set for 5 minutes. Wet down the bricks and concrete fill and then pour a 1:3 (1 cement, 3 sand) concrete mix with coloring added to match the bricks. The powdered coloring, available at building supply yards, is mixed according to instructions.

Make certain the topping is well packed at the corners and edges of the form to prevent hollows. Remove excess mortar with a straightedge (strikeboard) manipulated in short side to side strokes while pulling it toward you.

After the topping has become quite stiff but is still workable, go over it with a wooden float which gives it a nonskid (sidewalk) surface. Round off the edges and carefully remove the sideboards. Then round off the lower edges of the topping and make the grooves. Touch up with the wooden float and finally remove the over-



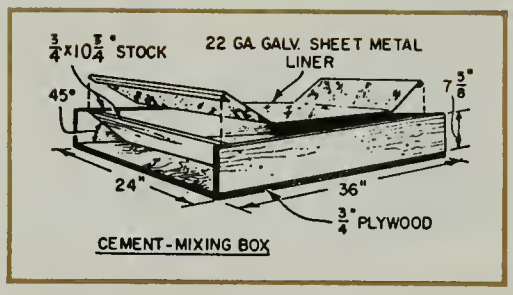

USE A SPIRIT LEVEL TO MAKE CERTAIN CORNER BRICKS ARE PLUMB AND FLUSH WITH ONE ANOTHER
FURROWING THE MORTAR ON WHICH A BRICK IS TO BE LAID
BUTTER THE END OF A BRICK THAT IS TO BE JOINED WITH THE LAST BRICK LAID WITH ENOUGH MORTAR TO PRODUCE A COMPLETELY FILLED JOINT
GUIDE LINE
TAP BRICK WITH TROWEL HANDLE TO LEVEL IT
LEVEL
REMOVE SQUEEZED-OUT MORTAR BY MOVING TROWEL UPWARD AND FORWARD
JOINTING TOOL
TOOLING THE JOINTS COMPACTS THE MORTAR
WHEN CUTTING A BRICK, HOLD BEVEL SIDE OF CHISEL FACING TOWARD WASTE PORTION OF BRICK
ANGLE-CUT BRICKS FOR SAWTOOTH BORDERS ARE JOINED TO CONCRETE FOOTING WITH 1/2" LAYER OF MORTAR
GUIDE LINE
BRICKS
FOOTING
MORTAR

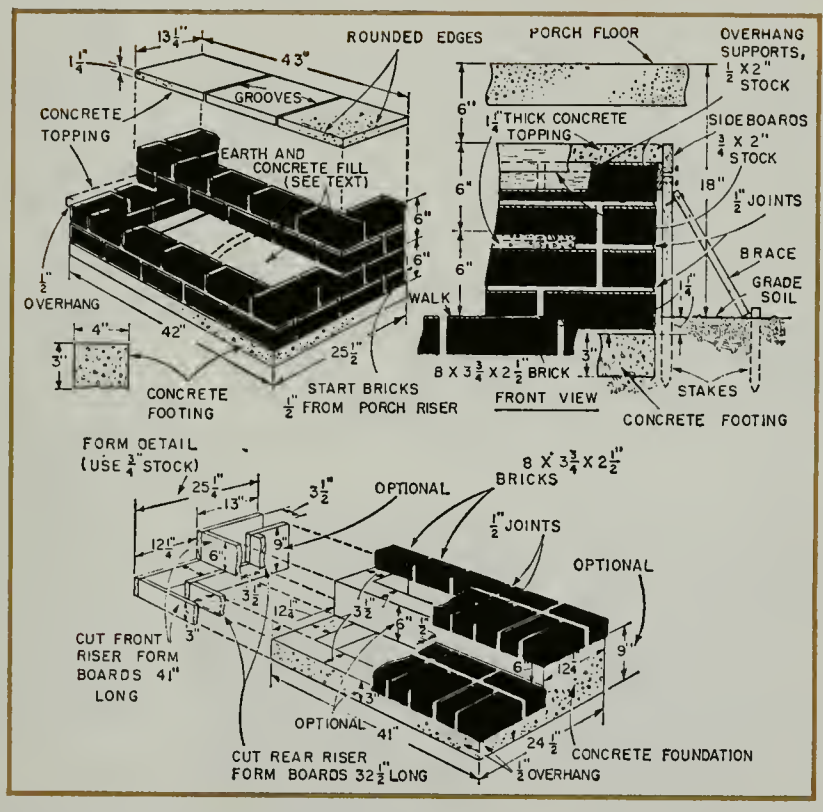
▲ *Brick steps. Overhang supports are not removed until concrete has hardened thoroughly.*

➤ *Field stones are used here for both the porch and the walk. To make the walk, stones were laid on a bed of concrete with mortared joints.*

hang supports. Make the topping for the lower step as you did for the upper step.

*Adjusting for porch height.* The step construction shown in the drawing is more flexible, in that it permits you to regulate the rise of the steps from 4 inches on up to 8 inches (average step height). Thus you can build steps for porch floors above or

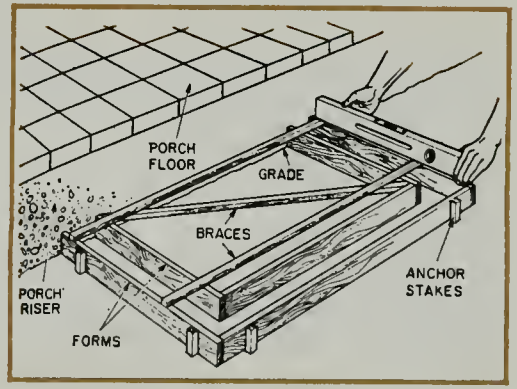


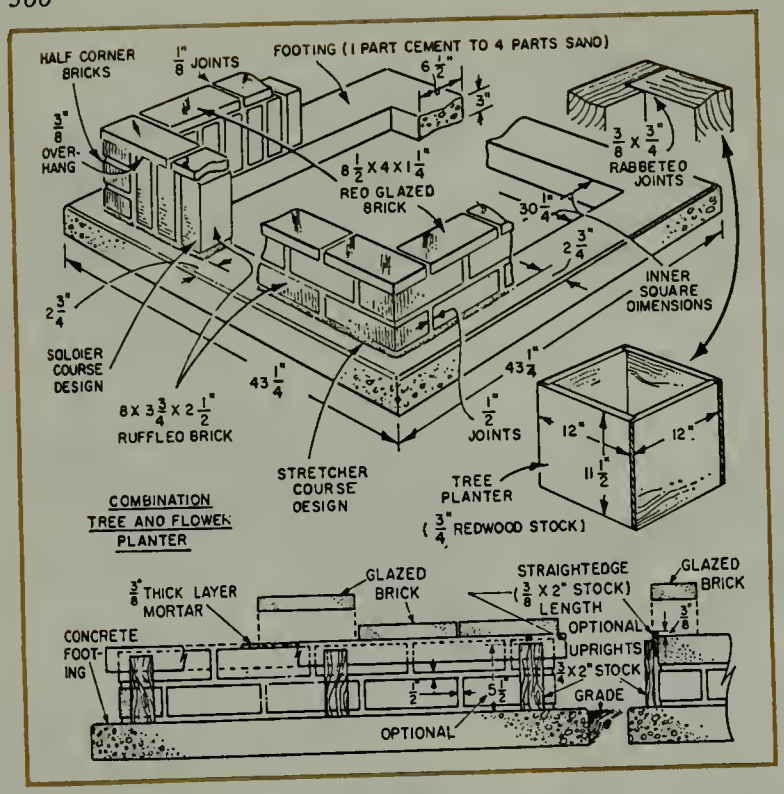



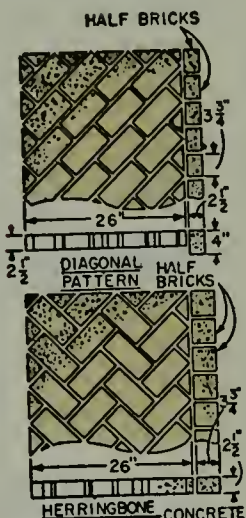

below the 18-inch level, merely by changing the vertical dimensions of the form boards.

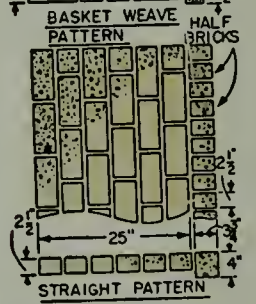
Let's say your porch is 21 inches above grade, for example. You'll need 7-inch high steps, each one-third the 21-inch distance. This means that you would add 1 inch to the 3- and 6-inch height dimensions, and 2 inches (1 inch for each step) to the 9-inch dimension.

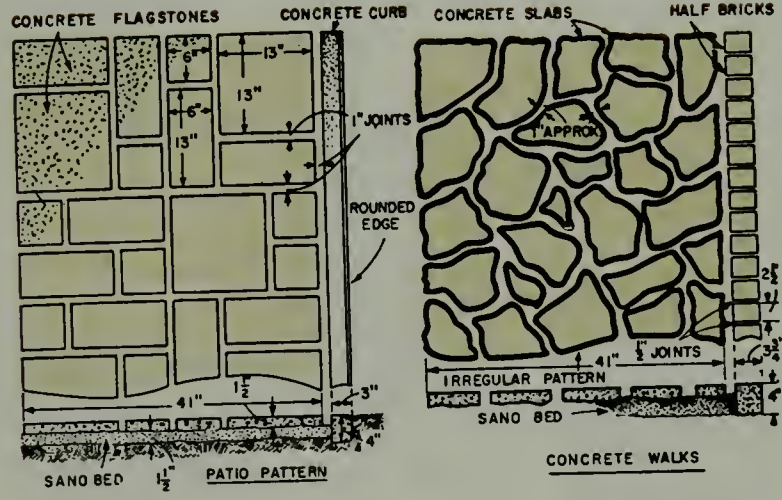
To take another example, if the steps are to have a 5-inch rise for a 15-inch high porch, deduct 1 inch from the 6- and 9-

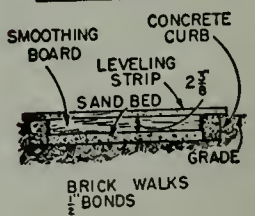




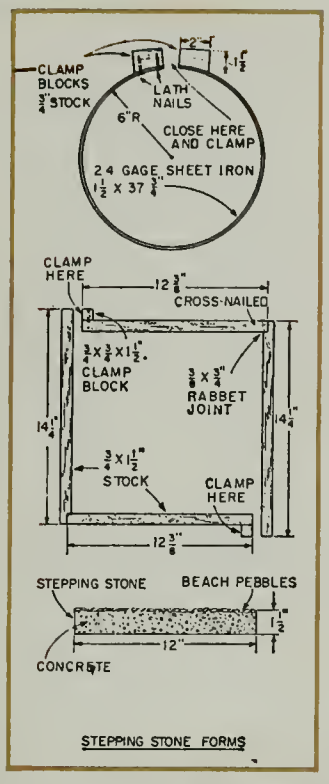




inch dimensions. Leave the 3-inch dimension as is and make a 1-inch deep excavation in the soil for the forms. Follow the same procedure for pouring the footing and adding fill described previously. But instead of the colored concrete topping, this time you will use brick treads laid on a ½-inch bed of mortar.

For the 21-inch porch, a walk would be laid 7 inches below the top of the first step; for a 15-inch high porch, 5 inches below.

*Making brick walks.* The brick walk




STEPPING STONE FORMS

shown in the photo is the basket-weave pattern. Note that the walk is bordered on the outer edge with a concrete curb colored to match the bricks. The other designs shown use half-brick borders. Where a walk leads directly to porch steps, make the walk (complete with borders) the same width as the steps.

For walks with concrete curbs, lay out the walk location and install the forms (using ¾-inch stock) at the ultimate level the walk is to be. For curved portions of walks, curbs or concrete borders, you can use strips of ⅛-inch Masonite hardboard for forms. When installing forms for walks, allow at least ⅛-inch pitch per foot, either lengthwise or crosswise, for proper drainage. Compact the soil between the form boards and pour in a 1:3 mix (1 cement, 3 sand, with red coloring added) in one operation. Let set until surface water has disappeared, and then round off outside edge of outer curb. Let concrete harden 24 hours before removing forms.

*Using a piece of ¾-inch plywood, long enough to span the concrete borders, to level the bricks. Medium taps with a hammer or mallet should seat bricks level with concrete.*

An easy method for laying a brick walk is to place the bricks on a bed of sand, fill the spaces between them with a dry grout mixture composed of cement and sand, and then sprinkle the surface with a fine, watery spray. The grout absorbs the moisture to form a bond between the bricks.

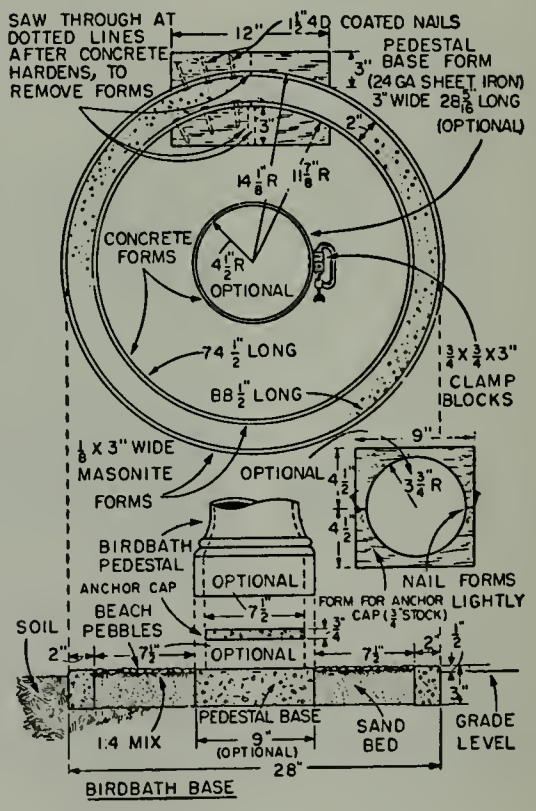
If 2½-inch thick bricks are used, remove the soil between the form boards to a depth of 4 inches, and compact the bottom of the excavation. Dump in the sand and spread it evenly with a smoothing board 2⅜ inches from the top of the curbs. This allows ⅛ inch for seating the bricks even with the curbs, or wood forms. Make up a dry mixture of 1 part cement to 6 parts sand and sweep it between the bricks filling the spaces up to the top. Make certain, of course, that the mixture and the bricks are completely dry, so that none of the cement will adhere to the top surface of the bricks.

Remove excess grout with a soft bristle brush and then wet the walk down thoroughly with a fine water spray. Avoid flooding or a direct, sharp stream of water from the hose. Keep the walk wetted down to slow down the drying of the grout. Allow at least a full week before putting the walk into service.

*Patios, terraces and flagstone walks.* You can use the same dry grout method when laying patios or terrace floors consisting of flagstones or concrete flags. The irregular shapes shown are broken concrete slabs salvaged from a torn up sidewalk. These can sometimes be had for the asking if you don't mind hauling them home.

In place of the dry grout method, you can used colored concrete to accent the patterns. Or you can remove the sand from below the joints, replace it with soil up to ¾ inch from the top, and seed the soil with grass or low growing plants.

*Making concrete flags.* You can actually make your own concrete flags at less than half the cost of commercially made ones. Simple two-piece wooden forms, similar to the square type shown in the drawing, can be made in the three shapes and sizes shown as the patio pattern. Use a 1:3 mixture (1 part cement, 3 sand) with just enough water to form a stiff concrete mix. This permits the forms to be removed within two or three minutes and made ready for the next batch. Flags are best made on a flat concrete surface which is



covered with a protective layer of black building paper. Coat the inside of the forms with linseed oil to keep concrete from sticking and give you smooth-edged flags.

*Pebbled stone projects.* Most masonry supply yards stock pebbled beach stones. These range from pea size to egg size, and add a decorative touch to an otherwise plain stepping stone. Use the 1 part cement, 3 parts sand mix and pour it to ¼ inch from the top of the forms. Completely cover the mixture with pebbles, leveling them with a stick of wood, as was done for the bricks.

Damp-moisten a soft bristle brush and go over the surface thoroughly to fuse the pebbles to the concrete. But don't use any more moisture—too much softens the concrete and causes it to crumble or break away from the edges when removing the forms.

If air temperature is around 70°F, you can remove the forms in about 5 minutes if you do it carefully. Any concrete picked up by the brush which adheres to the pebbles can be removed with a wire brush after the concrete hardens. Keep stones or flags wetted down and allow them to lay where formed for a full week before handling. Stepping stones can rest on a bed of sand placed in excavations made in the sod. They can also be bedded in pebbles.

As another use for pebbled beach stones, note the base for the pedestal-type bird bath shown in the drawings. The diameter of the pedestal base and anchor cap can be adapted to the size pedestal you have. To build this bath base, first excavate the soil to a 2½-inch depth and a 30-inch diameter. Anchor the forms with stakes and pour in a 1:4 mixture (1 cement, 4 sand). Round off the outer edges of the curbing after the cement has set for about one hour.

Give the concrete 48 hours to harden before removing the forms. Then fill the depression with sand to 1 inch from the top and add a ¾-inch thick layer of concrete topping. While this is still wet, place the pebbles as you did those used for the stepping stones. Finally, moisten the pedestal base and pour the concrete for the pedestal anchor cap if one is required.

*Circular stepping stones, with egg-size, loose beach pebbles between them, arranged around a brazier. Large stones are seats.*

*Embellishing stepping stones with a layer of beach pebbles.*

*See also:* CONCRETE; PATIOS; BARBECUES; FLOORS, BRICK.

# Library Wall Cabinet

**A useful piece of furniture, this library unit can be easily built out of common pine and Lauan paneling for about $30**

LIBRARY UNITS are always useful, whether they are used singly, in pairs, or to line an entire wall. They are attractive and functional pieces, offering shelves above for books and curios and storage cabinets below. Each unit is easily constructed and butt joints are used throughout. With the exception of the door panels and decorative arched valance, all cutting is straight and simple. Some router work is involved and some ready-made molding is used.

The cost of building the cabinet was kept way down by using common pine and Lauan paneling. The Lauan was used for the rear of the cabinet and also as a backup for the doors. Finished in antique green, the unit couldn't look any better even if it had been made of rock maple.

Start by cutting the sides, top and bottom as indicated. Before assembling the parts, cut the rabbet along one edge. This will form the recess for the back panel. Size the edge grain of the top and bottom sections by thinning the glue slightly with water. Let the glue dry about fifteen minutes, then apply glue in normal manner and assemble the sections. Use galvanized finishing nails and if clamps are available, use them. Be sure to work on a level floor and keep the frame square as the glue sets. If necessary, temporarily fasten diagonal cleats to hold the frame plumb.

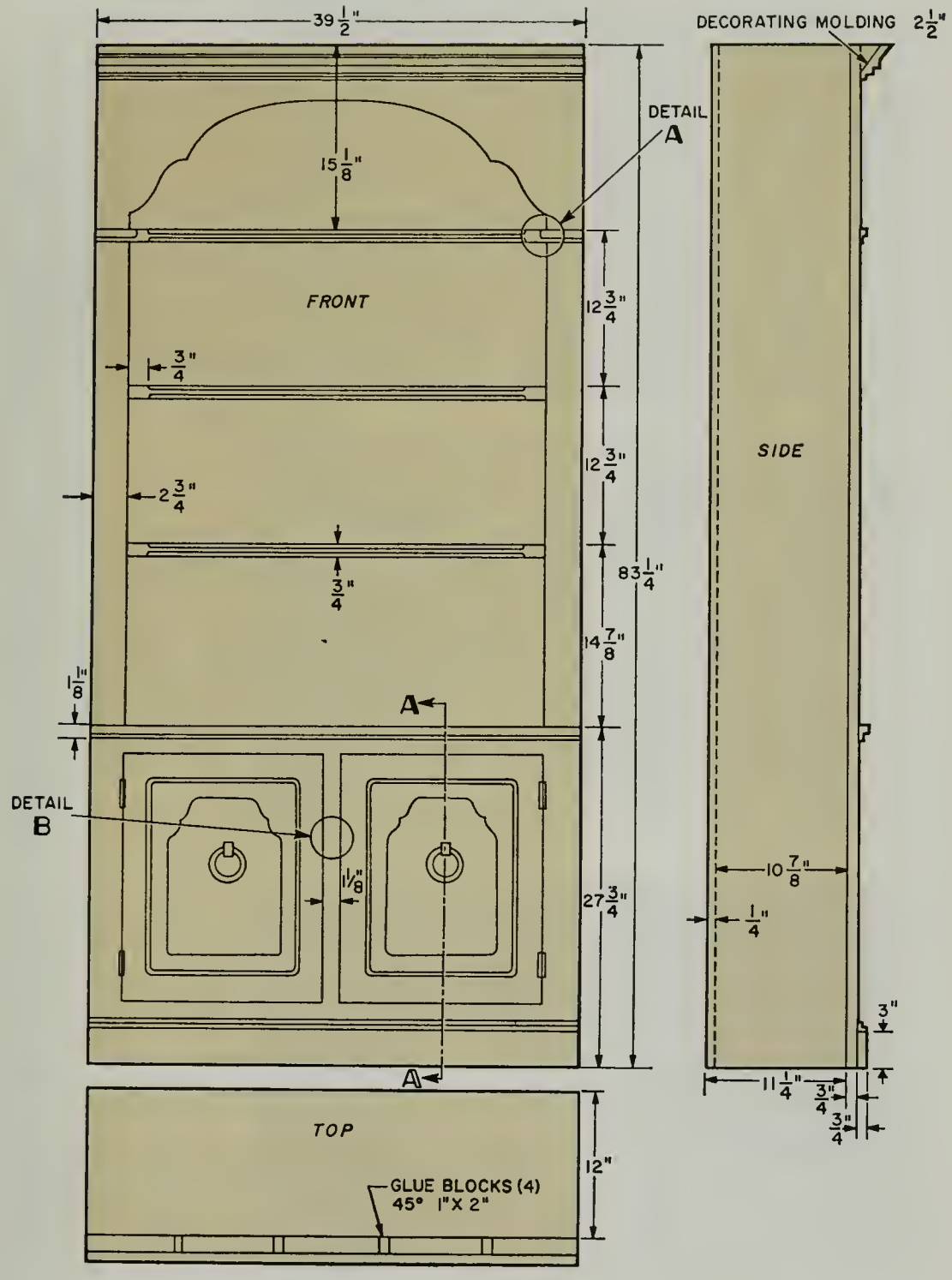
The shelves can now be cut and installed. Treat the edge grain as outlined above. The front edges of the three upper shelves are rounded after they are installed. The cabinet sides serve as a stop for the router, thus allowing the rounding-off to stop short of the front frame.

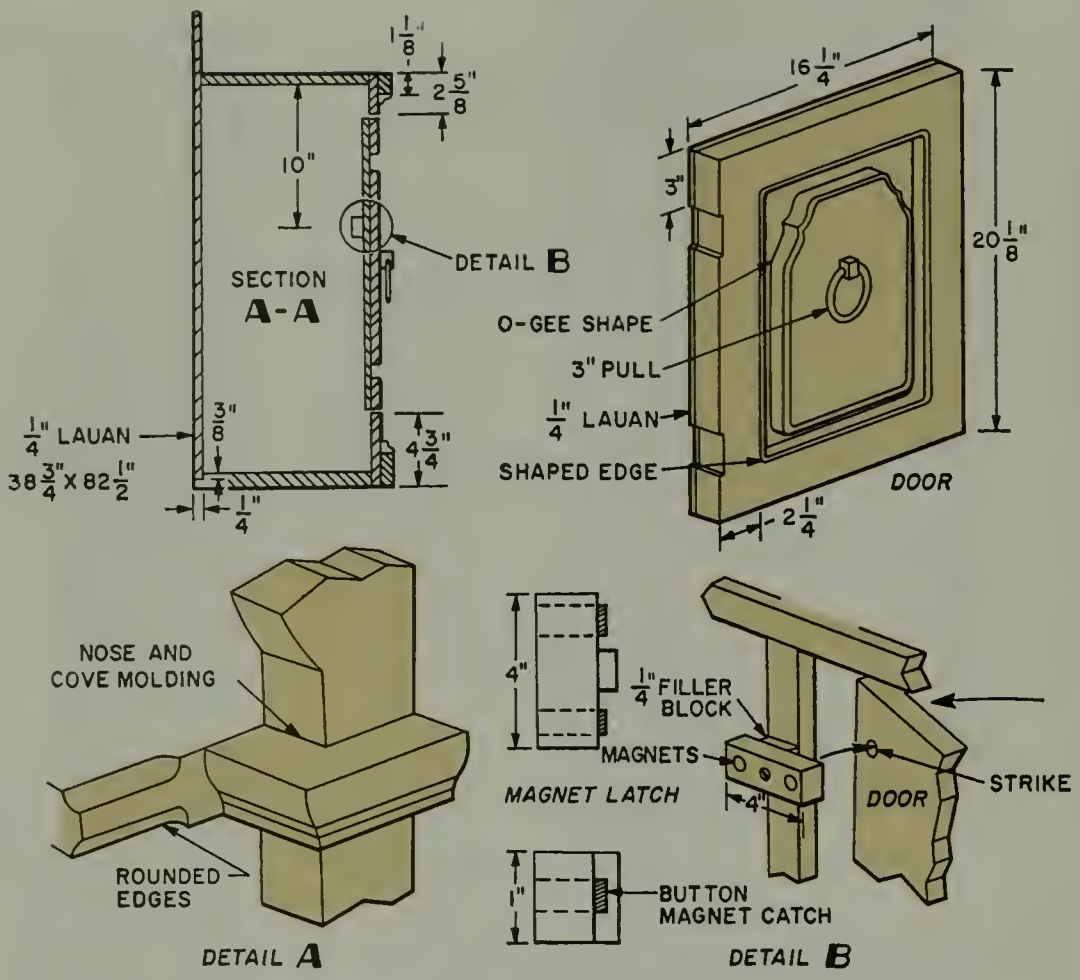
Front framing is added next. Attach one vertical first, then the crosspieces followed

**cabinet, sewing:** see furniture, indoor
**cabinet, sports gear:** see storage, sporting goods
**caddy:** see tool caddy
**camera:** see photography
**camera, stovepipe:** see macrophotography

*Library Wall Cabinet*








by the second vertical. This will assure a good tight joint. The door divider can be added at this time. Be sure to center it accurately.

The valance was made by blocking up a piece of 1 x 12-inch stock, although it could have been cut from a single piece of 1 x 18-inch. For economy, it is wiser to block up the ends as shown. Leave the length of the valance oversize and cut it to fit after the blocks have been glued. Use a saber saw to cut the arched curve, then shape the edge with a router.

The main shelf (above the doors) is built out by adding a filler strip and the front overhang. The overhang is cut 1⅛ inches deep to give the shelf a heavy look. Moldings are added now—apply with glue and brads. The small molding at the top shelf is mitered at the inside corners. The top molding (cornice) is mounted at an angle and to support it, small glue blocks are installed.

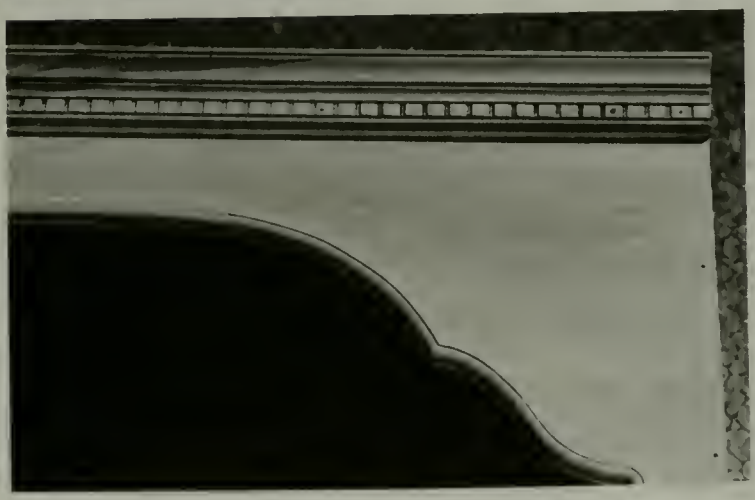
Doors are of simple construction. Stiles and rails are cut to size and assembled with dowels, using two dowels per corner. Clamps must be used here for a good glue joint. When the frame is glued, shape the

➤ *Butt joints, as shown, greatly simplify construction. Galvanized nails won't work loose.*

➤ *Here clamps are used to align all the cross members during the installation.*

➤ *As shown here, the valance is made by blocking-up a piece of 1 x 12-inch stock.*

*An effective raised panel is made by gluing the shaped piece to a ¼-inch backing.*



*Simple valance with cornice. Joint between it, side pieces are hidden by molding.*

*Hinge mortise in doors is cut on the table saw. First make the initial cuts on marks, then clean out the area in between.*

inner edges then attach the back board which is cut from a piece of ¼-inch plywood. The center section of the door is glued to the ¼-inch panel. To prevent center from shifting, drive a few small brads into it from rear.

Hinges are set into the door but they are mounted flush on the side panels. Hinge clearance in the doors can be cut in several ways. You can use a chisel, router, or table saw. The table saw method is fast and the results are very good. Measure the thickness of the hinge when closed, then allow the saw blade to protrude 1/16-inch less than the hinge thickness. For example, if the hinge measures 3/16-inch thick when closed, let the table saw blade protrude ⅛-inch. Mark the hinge positions on the door, and using the miter gauge, make a series of cuts between the marks to clean out the area. Install magnetic door catches or bullet catches as desired.

The rear panel is cut to size but not installed until after applying the finish material, as it is much easier to work this way. Be sure to sink and fill all nail heads then sand all surfaces until smooth.

When antiquing a large piece such as this, you may find it easier to work with an antiquing kit which has a latex base material. Latex will dry in a couple of hours as opposed to the overnight dry required by oil base materials.

Of course, you may want to stain or even leave the wood natural, with several coats of varnish or shellac. This is a matter of taste. However you finish your library unit, we are sure you will be greatly pleased with it. The design of the unit allows for expansion later if desired, and you can add one or more units to span a whole wall. J.C.

*See also:* ANTIQUING; FINISHING, WOOD; HAND TOOLS; POWER TOOLS; ROUTER; STAINING; TABLE SAW; WOODWORKING.

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 6 | 3/4" 10 7/8"x38" pine | shelves |
| 2 | 3/4" 10 7/8"x83 1/4" pine | sides |
| 1 | 3/4" 15 1/8"x39 1/2" pine | valance |
| 1 | 3/4" 3"x39 1/2" pine | base |
| 2 | 3/4" 2 3/4"x68 1/8" pine | vertical |
| 1 | 3/4" 2 5/8"x34" pine | filler |
| 1 | 3/4" 1 1/8"x39 1/2" pine | overhang |
| 1 | 3/4" 4 3/4"x34" pine | bottom |
| 1 | 3/4" 1 1/8"x20 3/8" pine | door divider |
| 1 | 1/4" 38 3/4"x82 1/2" lauan | rear panel |
| 2 | 1/4" 16 1/4"x20 1/8" lauan | door rear |
| 4 | 3/4" 2 1/4"x11 3/4" pine | door rail |
| 2 | 3/4" 9 7/8"x13 1/2" pine | door panel |
| 1 | 3/4" 1"x4" pine | catch block |
| 1 | 1/4" 1"x1 1/8" lauan | catch block |
| 8 | 3/4"x8" nose and cove molding | |
| 1 | 2 1/2"x39 1/2" decorative molding | |

**NOTE:** Also need, filler, glue, dowels, hardware, and finish coating.

# Console Cabinet and Mirror

**This handsome set can be built with the use of only one power tool, a table saw**

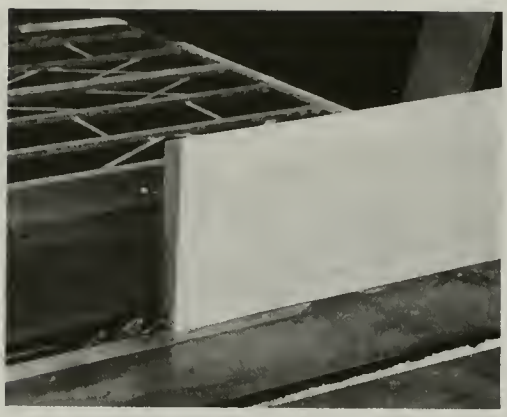
THIS BEAUTIFUL set was made with just one machine, a 10-inch table saw. All routing or shaping was eliminated by the use of standard stock moldings. Another outstanding feature is that by using common pine for the construction, the cost was kept to a minimum. Both pieces were built inexpensively.

The construction is not difficult. If you haven't had much experience cutting angles on the table saw, you most certainly will after this project. Both blade tilting and miter gauge angle cutting are used extensively. The only tricky cutting involves the crown molding at the base of the cabinet and top of the mirror. The crown molding must be cut at the angle in which it will be used. This means that it must rest against the miter gauge at this angle. In addition, the miter gauge must be set at an angle either 22½° or 45°. The 45° cut is made for the mirror, but the console requires 22½° cuts. If you don't already possess one, you should fit your miter gauge with an auxiliary back stop. This will facilitate the cutting of moldings and it also makes for more accuracy, as it prevents any "give" in the work piece.

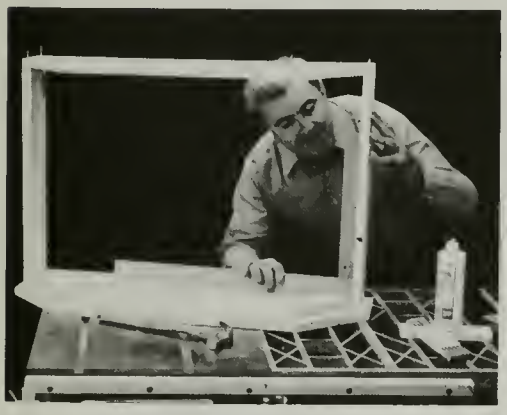
Before starting work, check the calibration on the miter gauge and the blade tilt. If it is off, make the necessary adjustments. To check for accuracy, make two sets of 45° cuts on scrap wood. Make one set using the miter gauge and the other with the blade tilt. When joined, each set should make a perfect 90° corner which you can easily check with a try-square.

Cut the lumber to size and where possible, cut between knots. If the knots must be included, try to locate them where they will be covered with panels or moldings later. If the lumber used for the sub-top and bottom are badly warped, rather than waste them, cut a few longitudinal grooves on the hidden side. When assembled, the sections should flatten out perfectly.

▲ *Sub-top is nailed with a set-back at rear, allowing for thickness of rear panel.*



▲ *Rabbets are cut on saw using rip fence as shown. Make the vertical cut first.*

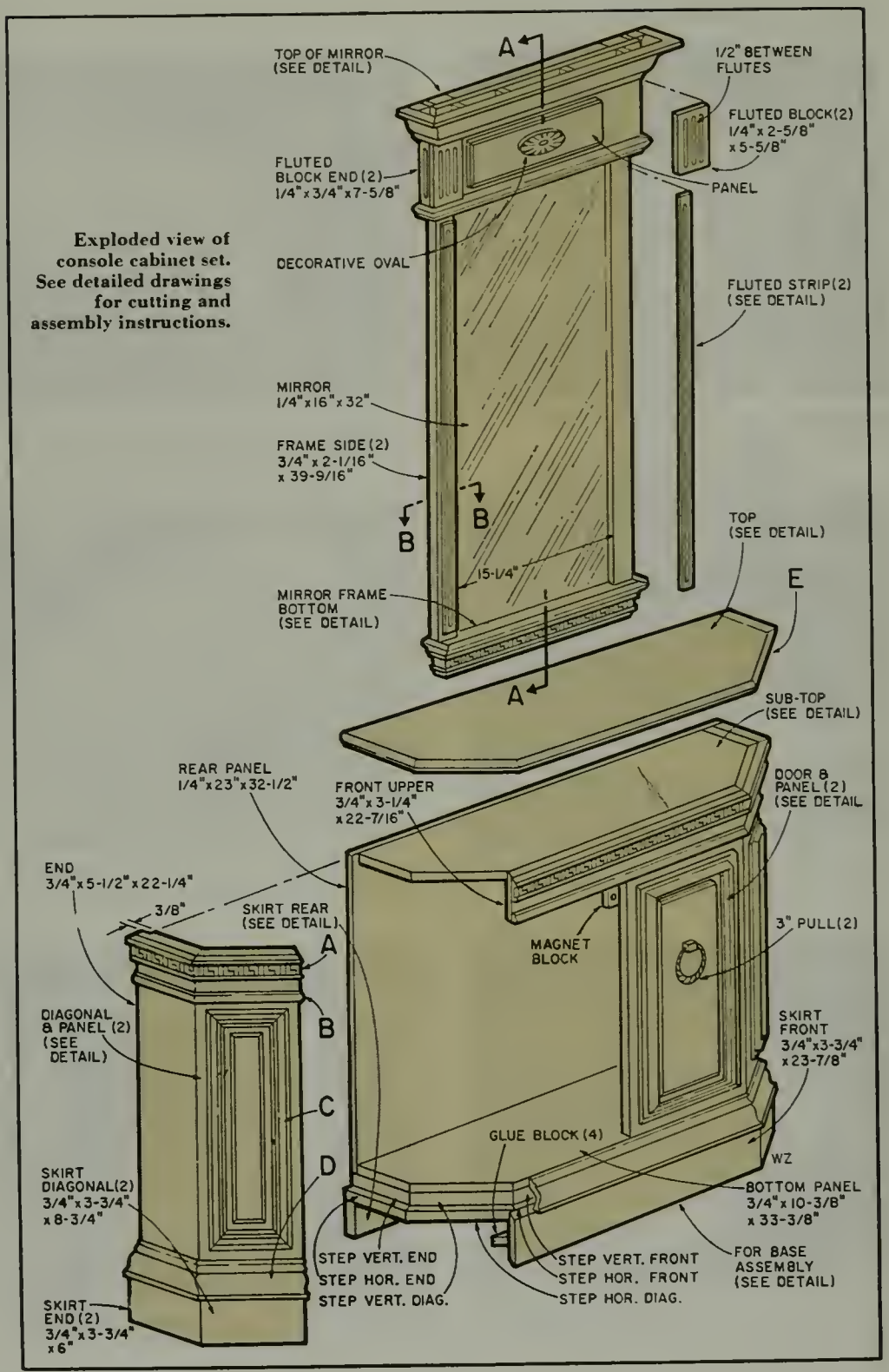


▲ *Be sure sections are square as you assemble cabinet. Use glue, finishing nails.*

▲ *Base molding is used to frame panels. Temporary gauge block facilitates assembly.*

▲ *Here beveled panels are given a coat of glue, then carefully centered in frame.*

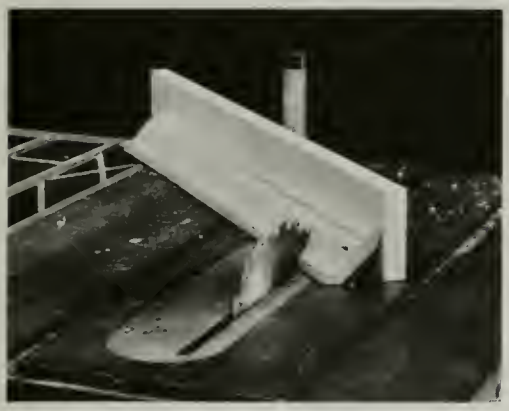
▲ *Toe nail panels when assembling for greater strength, using nails generously.*




**Exploded view of console cabinet set. See detailed drawings for cutting and assembly instructions.**

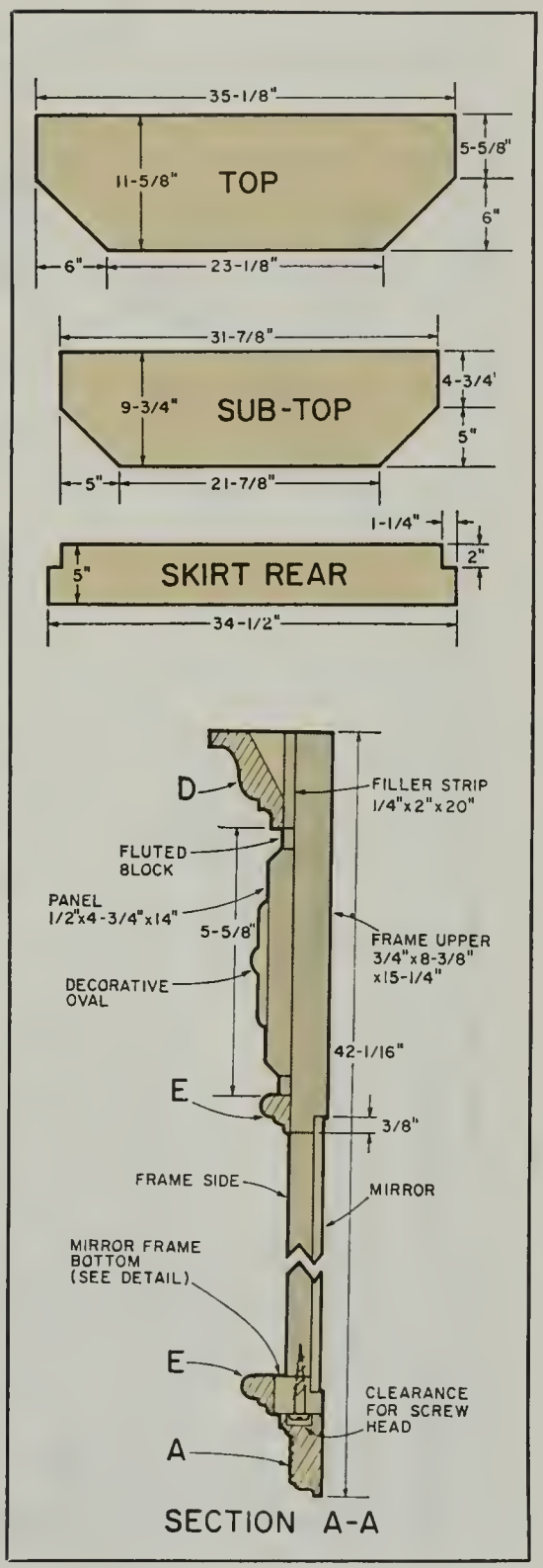
*Console Cabinet and Mirror*

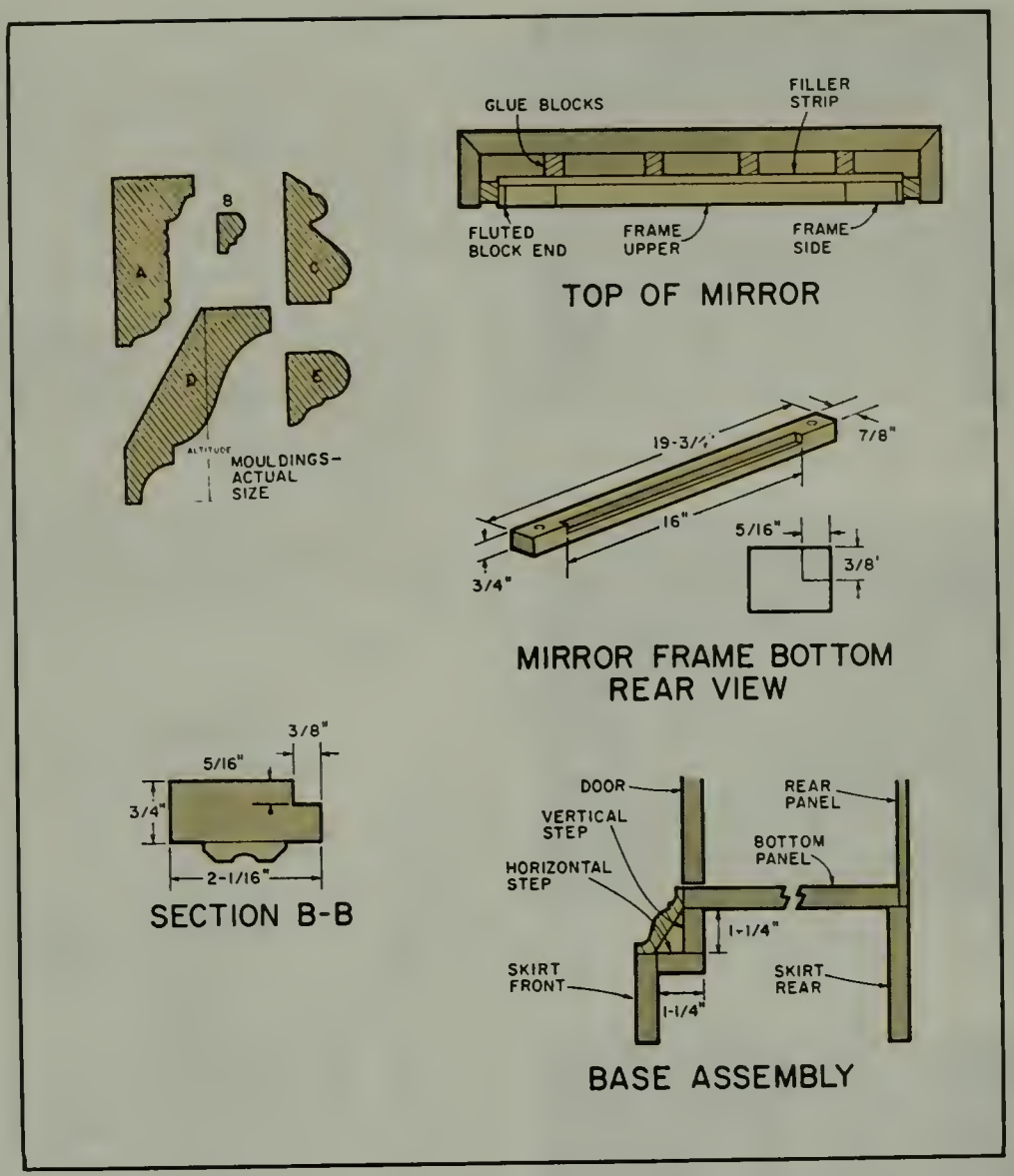
▲ *Bottom step is added as shown. The kerf cuts were made to straighten warped board.*



▲ *When cutting crown molding, support it in the angle in which it will be used.*

▲ *Greek-key molding adds finishing touch to cabinet. Check miters before gluing.*






The lumber used was 1 x 12-inch (actual size ¾ x 11¼-inch). The depth of the top measures 11⅝ inches so we had to glue up a strip to make this piece. The other choice would have been to buy a wider board.

The sub-top is not an essential piece but it greatly simplifies assembly. The same results are possible using nailing cleats but the assembly would be more difficult. When nailing the sub-top to the top, set the back edge in ⅜-inch, thus forming a rabbet for the rear panel. The end panels are rabbeted on one edge and mitered on the other. Note that the miters are 22½° because the shape of the cabinet is actually half of an octagon.

The raised panel effect is achieved by the use of beveled boards framed with base molding. Note that the moldings are used

in reverse, low side out and the high edge toward the center.

Assemble all parts with white glue and nails. When gluing mitered moldings be sure to apply the glue to the miters and wipe off excess before glue sets.

When assembling the end and diagonal panels together drive a couple of nails along the edges to close the joint while the glue sets.

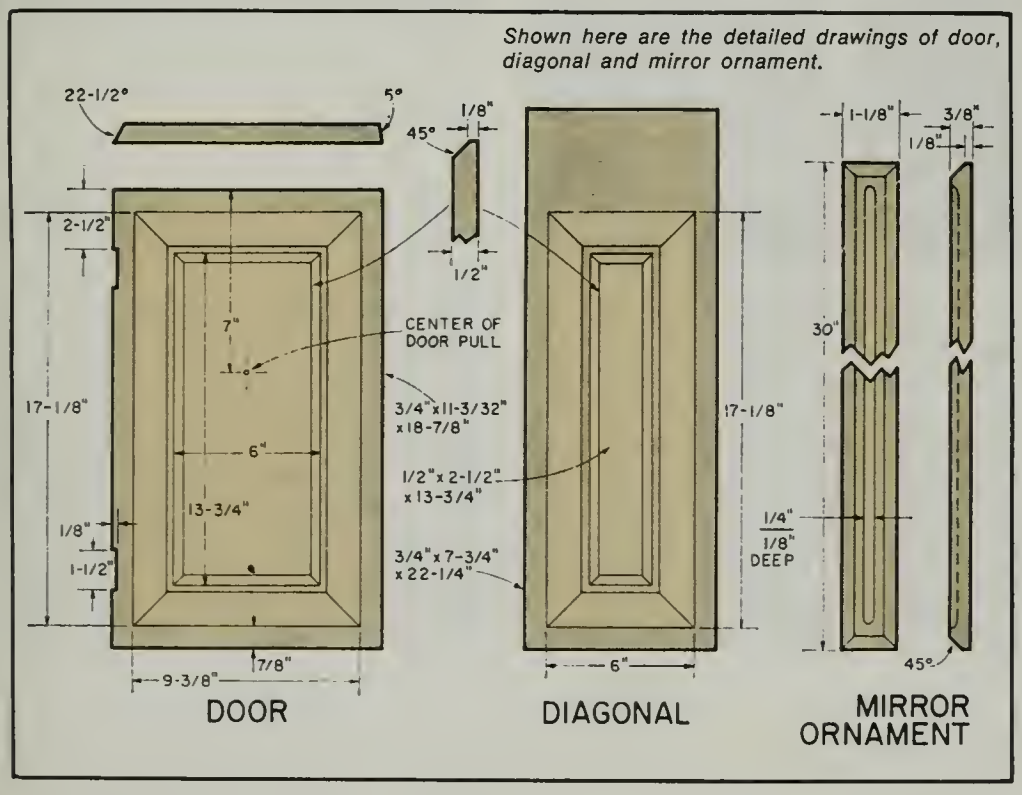
Before cutting and adding the steps for the set-out at the base, check the altitude of the 2½-inch crown molding. The altitude of the molding is the vertical measurement taken when the molding is resting on a horizontal surface. See drawing. The moldings will vary in size between manufacturers, so check this carefully. The step must be cut so that when the moldings rest on it, the top of the molding will be flush with the top edge of the bottom panel.

Doors are cut with about $\frac{1}{16}$-inch clearance all around. Gain for the hinges is cut fully on the doors. This eliminates the need for cutting into the door frame. Before assembling the doors, drill the holes for the pull screw. Note the clearance for the screw head.

The addition of the moldings completes the base. Use ¾-inch nose and cove at the top and note that it is set down $\frac{1}{16}$-inch to form a step. The Greek key is added next, followed by the miniature nose and cove just above the door line. The crown molding takes care of the bottom.

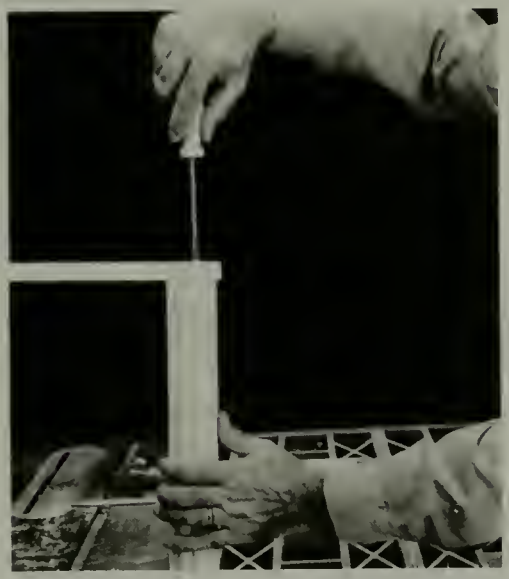
The mirror frame is not as difficult to build as it may seem. Moldings again play an important part in construction. Like the console, all lumber is pine.

The fluted pieces are made on the table saw using a molding head. We used the groove part of a tongue and groove set. The tip of the cutters was ground round to form the half-round groove, but it could be left square to achieve the same effect. To determine where to start and stop the cut, it is best to make trial cuts on scrap wood. There are two ways to make the cut; in each case the fence is used to guide the work. You can elevate the blade to the proper height ($\frac{3}{16}$-inch), then carefully lower the work onto it; or you can place



▲ *Position hinges by opening them all the way. Fit into corner; locate screw holes.*

▲ *Door is propped up at bottom with shim to achieve proper spacing top and bottom.*



▲ *Shown is mirror panel which is cut from ½-inch pine. The carved applique will be centered in the panel.*

◀ *The bottom piece of the mirror frame is held with screws and glue. All other joints are nailed.*

the work in position, hold it firmly, then raise the blade to its $\frac{3}{16}$-inch protrusion and feed the work until you reach a predetermined stop marked onto the table. The built-up columns at the top are made by adding blocks as indicated in the drawings. The decorative oval in the top panel of the mirror is available at most lumber yards that carry carvings. Most carved wood moldings are bowed slightly. To remedy this, simply moisten the back with water and flatten. Apply with glue and a couple of brads.

When the construction is completed, fill all nail holes then sand thoroughly. Dust and finish as desired. We used antique green, highlighting the high spots and letting the corners go dark. Antiquing kits are readily available in a variety of colors with easy-to-follow instructions. J.C.

*See also:* ADHESIVES; ANTIQUING; FINISHING, WOOD; LUMBER; MOLDINGS; TABLE SAW; WOODWORKING.

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 1 | 3/4" 11 5/8"x35 1/8" pine | cabinet top |
| 1 | 3/4" 9 3/4"x31 7/8" pine | cabinet sub-top |
| 1 | 3/4" 3 1/4"x22-7/16" pine | cabinet upper front |
| 1 | 3/4" 5 1/2"x22 1/4" pine | cabinet end |
| 2 | 3/4" 7 3/4"x22 1/4" pine | cabinet diagonal |
| 2 | 3/4" 11-3/32"x18 7/8" pine | cabinet door |
| 2 | 1/2" 2 1/2"x13 3/4" pine | cabinet diagonal panel |
| 2 | 1/2" 6"x13 3/4" pine | cabinet door panel |
| 1 | 3/4" 3 1/4"x3 1/2" pine | cabinet magnet block |
| 1 | 1/4" 23"x32 1/2" plywood | cabinet rear panel |
| 1 | 3/4" 10 3/8"x33 3/8" pine | cabinet bottom panel |
| 2 | 3/4" 3 3/4"x6" pine | cabinet skirt end |
| 2 | 3/4" 3 3/4"x8 3/4" pine | cabinet skirt diagonal |
| 1 | 3/4" 3 3/4"x23 7/8" pine | cabinet skirt front |
| 1 | 3/4" 5"x34 1/2" pine | cabinet skirt rear |
| 2 | 3/4" 1 1/4"x5 5/8" pine | cabinet step horizontal end |
| 2 | 3/4" 1 1/4"x8 1/4" pine | cabinet step horizontal diagonal |
| 1 | 3/4" 1 1/4"x23 1/4" pine | cabinet step horizontal front |
| 2 | 3/4" 1 1/4"x5 1/8" pine | cabinet step vertical end |
| 2 | 3/4" 1 1/4"x7 1/2" pine | cabinet step vertical diagonal |
| 1 | 3/4" 1 1/4"x22 1/2" pine | cabinet step vertical front |
| 1 | 3/4" 8 3/8"x15 1/4" pine | mirror upper frame |
| 2 | 3/4" 2-1/16"x39-9/16" pine | mirror side frame |
| 1 | 1/4" 2"x20" pine | mirror filler strip |
| 1 | 3/4" 7/8"x19 3/4" pine | mirror bottom frame |
| 1 | 1/2" 4 3/4"x14" pine | mirror panel |
| 2 | 1/4" 2 5/8"x 5 5/8" pine | mirror fluted block |
| 2 | 1/4" 3/4"x7 5/8" pine | mirror fluted block end |
| 2 | 3/8" 1 1/8"x30" pine | mirror fluted strip |
| | 2 1/2"x96" crown molding | trim |
| | 3/8"x48" nose and cove molding | cabinet trim |
| | 3/4"x20' base molding | cabinet trim |
| | 3/4"x120" nose and cove molding | trim |
| | 1 3/4"x84" greek key | trim |

**NOTE:** Also need glue, wood filler, decorative oval, mirror, finishing coat, and hardware.

# Corner Display Cabinet

**This handsome space-saver providing a decorative display of bric-a-brac is surprisingly easy to build**

ALTHOUGH it looks complicated, there are short-cuts that take much of the hard work out of the project. First is use of readily-available decorative molding strips; second is use of flexible wood tape to cover exposed plywood edges. The fancy scalloped curves on side pieces, fringe, and skirt can be cut with a power jig saw or saber saw, and if you clamp the two side pieces together you can use a wood rasp and sandpaper to get exactly-matching curves.

The entire cabinet is made of ¾-inch thick veneered plywood, except for the door facings. These are ½-inch plywood. Use the veneer surface of your choice (birch, ash, mahogany, walnut, etc.) and buy wood tape to match.

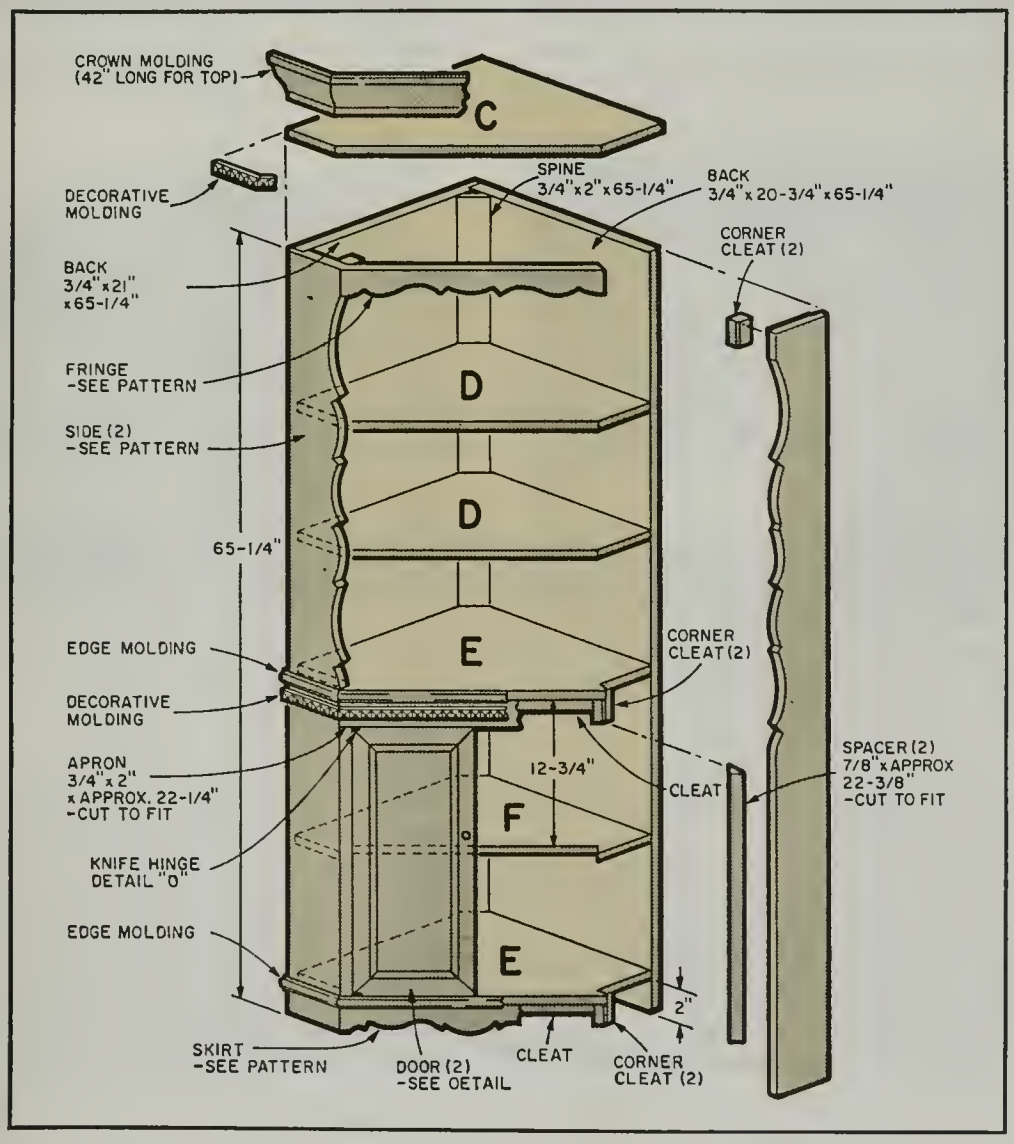
Cut out the two back pieces. Note that one panel is 21 inches wide, the other is 20¾ inches. Rabbet the front and back edges of the narrower panel as shown in Detail A. Now cut out the bottom, top,

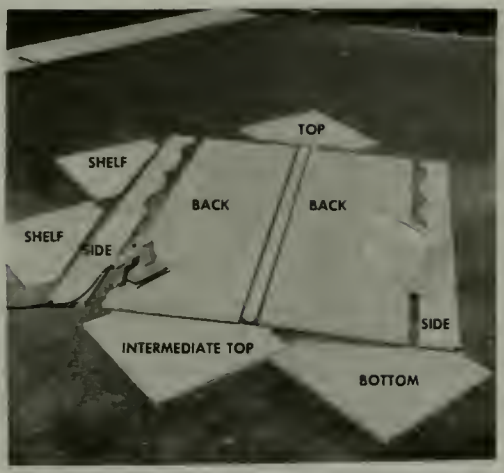
intermediate top, and the shelves. Make up full-size patterns for the side piece scallops (or use those available as noted at the end of this article), trace them on the rectangular side pieces, and cut the wood to shape. Clamp the side pieces together as noted above, and trim to smooth, fair curves.

Make up the spine from ¾-inch plywood (or hardwood), and bevel each side to a 45° angle. This gives added strength to the back joint.

Use glue on mating surfaces, and fasten the two back panels together with 1¼-inch #8 flat head wood screws. Be sure to drill pilot holes for all screws, and countersink for the heads. Next install the spine and the top panel with 1¼-inch #8 flat head wood screws, after coating the mating surfaces with glue.

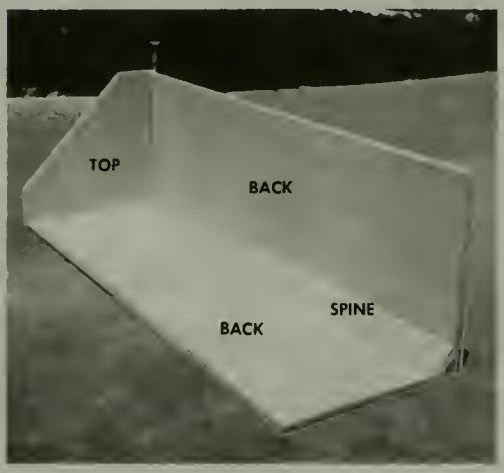
Rabbet the rear edges of the two side pieces, and install them as shown in Detail A. Now you can install the bottom panel, the intermediate top, and the upper shelves. Cover the exposed edges of the shelves with wood tape before installation, and be sure that all these panels are square with the



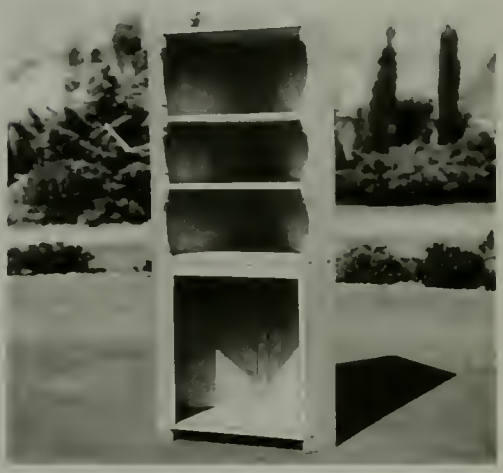



▲ *Sand inside surface of all backs before assembly. Cover exposed scalloped plywood edges of sides with flexible wood tape.*

▲ *Assemble entire cabinet with glue and #8 1¼-inch screws. Start with backs, then top. Drill pilot holes for screws as shown.*




▲ *Shown here are the assembled backs and top along with installed spine, before the sides have been added with glue and screws.*



▲ *Next install intermediate top, apron and shelves. Cover front shelve edges with tape. Apron's held in place with screws, cleats.*

back and side pieces. Again, use glue on mating surfaces, and fasten with 1¼-inch flat head wood screws.

Make up a cleat of ¾ x ¾-inch pine stock, as shown in the exploded perspective drawing. Install it underneath the intermediate top, and fasten the apron to it. The face of the apron should be flush with the edge of the intermediate top.

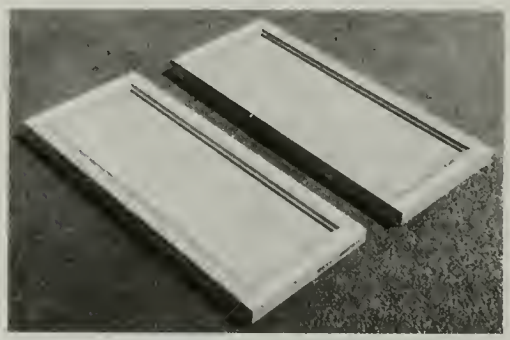
Cut out the two spacers from ⅞ x ⅞-inch pine or other hardwood stock, and bevel one side of each to a 45° angle as shown in Detail A. These spacers are installed along the front edge of each side piece, bottom and intermediate top panels.

Use full size patterns for the skirt and fringe pieces, cut the pieces out, sand the curves smooth, and install them. The fringe goes under the front edge of the top panel, and the skirt goes under the front edge of

▲ *Install fringe and skirt after covering exposed scalloped edges with tape. Install door molding at top and intermediate top.*

▲ *Attach door facings with glue, #8 1-inch screws from the backside of the door; the molding is attached with glue, small brads.*

▼ *Completed doors are shown. Before hanging doors with knife hinges, install cabinet shell with front edge covered with tape.*



the bottom panel. Make cleats of ¾ x ¾-inch stock as shown in the exploded perspective view, and install them behind the fringe and skirt pieces. Cover the scalloped edges with flexible wood tape.

Now install the decorative molding at the top and intermediate top. Bevel the corners and use the same trim along the sides. Use

**MATERIALS LIST**

| Quantity | Size and Description | Purpose |
|---|---|---|
| 2 | ¾" 4'x8' plywood veneer of your choice | basic unit |
| 1 | ½" 8"x36" plywood | door facing |
| 1 | ¾" 3"x36" hardwood | cleats |
| 2 rolls | 1" flexible wood tape | |
| 1 roll | 2" flexible wood tape | |
| 1 | ¾" to 1"x72" decorative molding | |
| 1 | ¾"x72" edge molding | |
| 1 | ½"x12' door panel molding | |
| | 42" crown molding | top |
| as needed | #8 1¼" flathead wood screws | |
| as needed | #8 1" flathead wood screws | |

**NOTE:** Also need, glue, brads, finishing coats and hardware.

glue and small brads to fasten the molding in place. Set the brad heads below the surface of the wood, and cover with matching wood filler. Cut out and install the cabinet shelf in the lower compartment after covering the front edge with wood tape.

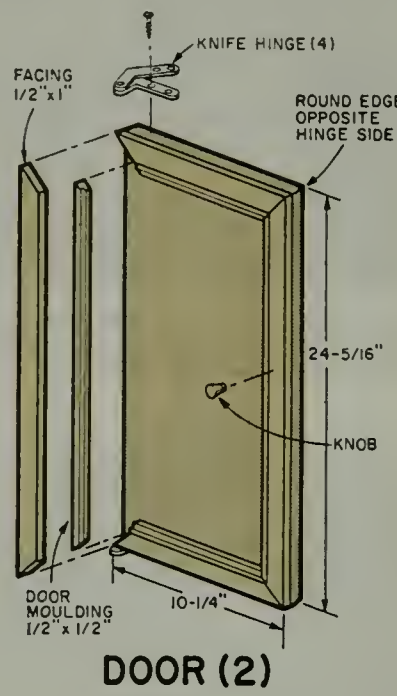
Make up the two doors from ¾-inch plywood, with ½-inch plywood facings and decorative molding around the edges as shown on the plans. Note that corners of facings and moldings must be mortised carefully for a snug fit. Round the edge of each door on the side opposite the hinges, and cover the exposed top and inner edges with wood tape.

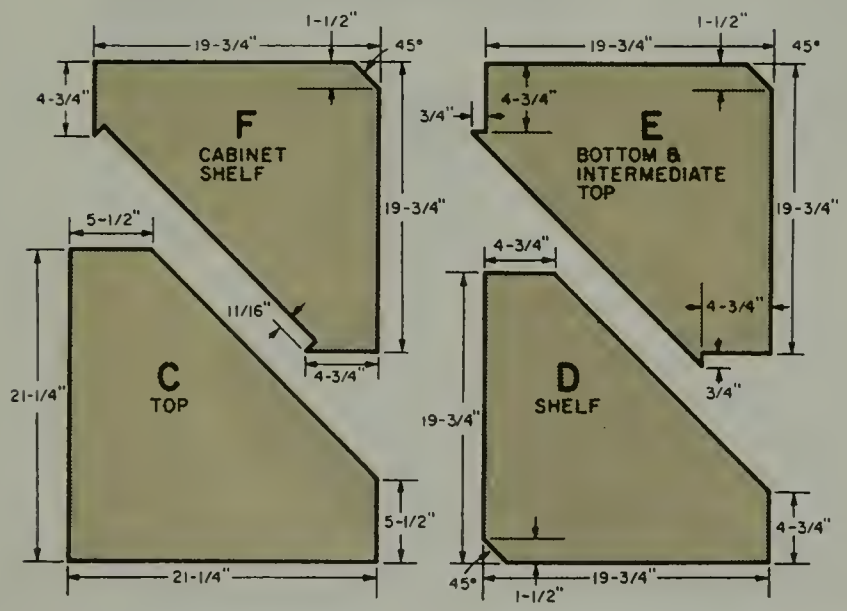
For hinges, use the new knife type used by radio cabinet manufacturers. These come in left hand and right hand models, and they feature stops that prevent the doors from swinging all the way back. See Detail B for hinge and door relationship.

Finally, sand the cabinet lightly, and finish with two coats of varnish or other clear coating to bring out the natural beauty of the wood. Sand lightly between coats, and if additional coats are needed, sand before application. When the final coat is dry, install the doorknobs of your choice, and the project is done.

*Original design by Steve Ellingson.*

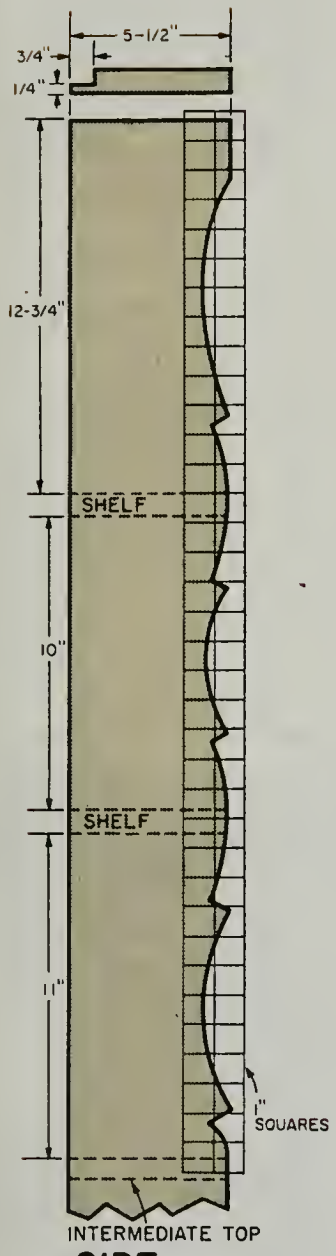
*See also:* HAND TOOLS; POWER TOOLS; ADHESIVES; ABRASIVES.



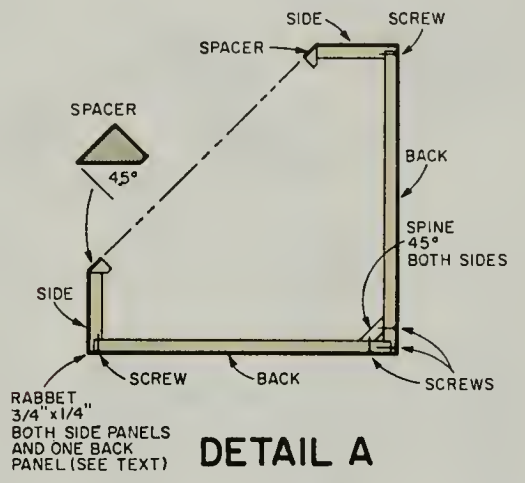




*Above: Diagram of doors, facings, molding. Round edge of side opposite knife hinge. Left: Detailed top, shelf, bottom and intermediate top, and cabinet shelf.*

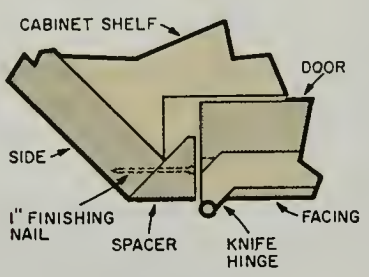
*Left: Side pattern view. Right top: Rabbet front, back edges of narrower 20¾-inch panel. Right center: Hinge, door relationship. Right bottom: Scalloped skirt and fringe pattern.*



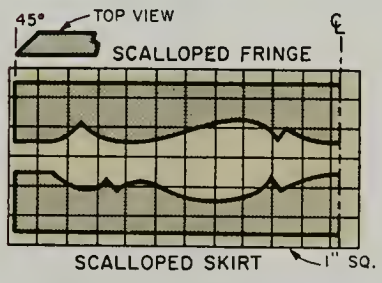

SIDE PATTERN



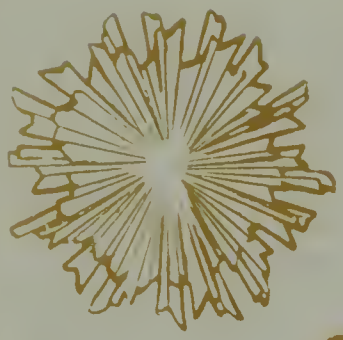

DETAIL A

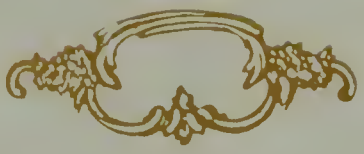



DETAIL B




SKIRT & FRINGE PATTERN





# How to Buy Cabinetmaker's Supplies

**Knowing what is available and where you can find it will help you to become an expert woodcraftsman**

HAVE you ever wondered where to match authentic antique hardware, or to get rare woods your local lumberyard never heard of, or tools the corner hardware store doesn't stock? The cabinetmaker's supply houses are your answer.

*Rare woods.* If you have any doubts when matching wood in the repair of a choice antique, or in the duplication of a museum treasure, real wood samples are available. These are not small chips, but pieces large enough to allow you to make a thorough study of the wood tone, grain pattern, and texture. After they have served their purpose in helping you make your selection for the project at hand, they can be used to advantage in inlay work with other woods.

Large houses provide such a sampling; they have woods from all over the world, such as rosewood in different species from the East Indies and Brazil, ebony from India, harewood from England, Carpathian elm burl from France, to name just a few. Unless otherwise stated, these fine veneer woods are cut $\frac{1}{28}$-inch thick, and are available in lengths from 36 inches up. You can order just the amount your project requires.

How do you apply these beautiful veneers to the surface of your table or chest as the case may be? A simple-to-operate veneer press does the trick. You may buy the parts and assemble one to suit your own shop, or buy a ready-made unit, both from the cabinet supply house. A new contact-type glue for use without a press is also available.

*Inlays.* Many period pieces owe their distinction to the use of inlay work. This aspect may intimidate the amateur craftsman when he first looks at some of the lovely but intricate designs used by the old masters of this art. But, here again, ready-made inlays in almost limitless variety are available with colored woods and motifs to enhance and beautify almost any project you can name.

Designs range from simple geometric forms that can be used on contemporary pieces as well as the classic type of project to charming and delicate floral patterns suited to a lady's desk or a formal coffee table, all executed in real wood, ready to be fitted into the work. One supply house

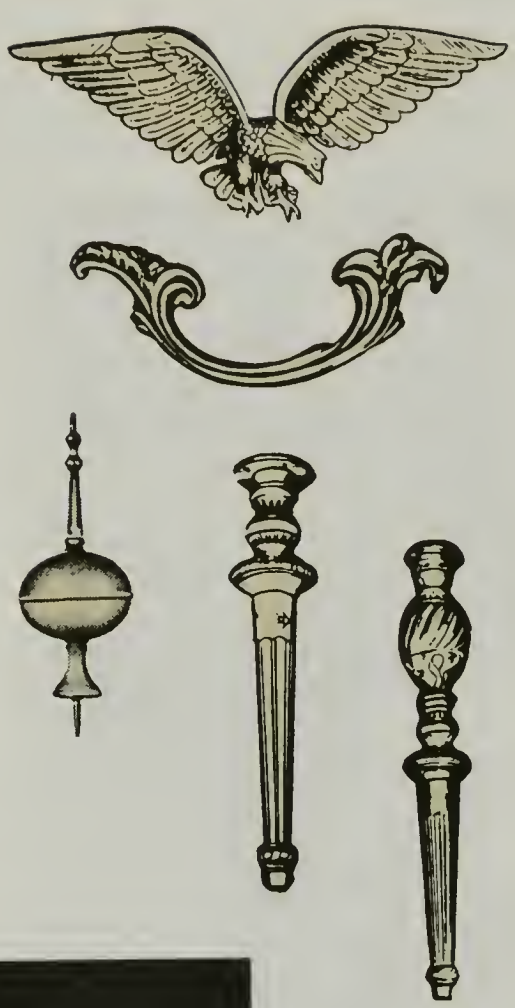
has over fifty, and the only difficulty is deciding which to use!

Inlays may come to you linen-backed or paper-backed. Linen-backed come with the finish surface up. Paper-backed are the reverse; the finish side is covered with paper. To keep them intact during shipment, they are held in a frame. Follow the instructions for releasing the inlay from the frame.

*How to apply inlays.* Inlays can be used in two ways. One is to simply glue the inlay over the finished surface, but this is not quite as elegant as a true inlay job. To do this, outline the inlay on the surface, and rout out the project to a bit less than the thickness of the inlay. This gives you a little leeway in your final sanding of the project. However, you may rout to a flush fit and sand and finish the entire surface in one operation.

After fitting the inlay dry, remove it carefully and use the glue recommended by the supply house. It takes about an hour to harden, but permits you to push the inlay into place with finger pressure. Apply weights until it is firmly set.

After glue is hard, sanding is the order of the day, and then the final finish.



*Ornamental surface hinges require no mortising. A pair of H or H-L hinges will support most doors. For additional rigidity, use an H hinge between two H-Ls.*

*Important note:* If you use a colored or toned finish on the area surrounding the inlay, protect your inlay with a coat of clear shellac to prevent discoloration of the different woods.

*Inlay borders,* which are ordinarily sold by the yard, are amazingly inexpensive and beautiful. They may be applied the same as the regular inlays, by routing, and their varied colors can change a simple table top into a conversation piece. Follow the same general instructions for this type of work. For a truly different and unusual effect, use inlay borders instead of the tape type so prevalent nowadays, to conceal the raw edges of plywood surfaced tables, or where end grain presents a finishing problem.

▲ *Overlapping (lipped) doors are hung with semi-concealed hinges. These are especially suitable for plywood doors because the screws are driven against the grain of the wood.*

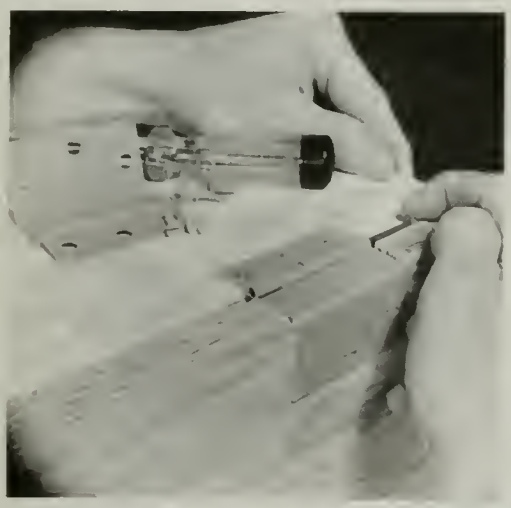
➤ *Concealed pin hinges give flush doors a neat, modern appearance. Use a pair for small doors, three for larger ones.*

Since they are all wood, they blend or contrast with pleasing effect.

*Carved trim.* Don't think that hand carving on furniture is beyond your skill, time, and budget. Cabinetmaker's supply houses stock it ready-made. All carved from kiln-dried hard white maple, it can be matched to any type of finish. It can transform a simple open bookshelf by its use as an edging. With tasteful gilding treatment, period elegance can grace an otherwise dull project. This carving is also a boon in panel work on cabinet fronts that would otherwise be lackluster.

*Molded wood carvings.* Less expensive than actual wood carvings, molded carvings fill the bill when economy is a factor. Usually supplied with brad holes, they are easily applied with brads and glue. When non-grain-raising stains are used, it is a simple matter to match the wood used in the main body of the piece. They can be machined just like wood, and come in a great variety of designs, from simple, dignified borders to elaborate floral and leaf patterns to inspire the designer in his home shop.

*Furniture finishing materials.* A wide selection of polishes, stains, bleaches, cleansers, and thinners, as well as fine brushes, are available at the supply houses. When



*Semi-concealed pin hinges give the appearance of ordinary barrel hinges (only the barrel shows when the doors are closed), but allow the screws to go against the grain in flush plywood.*

*Drawer pulls are available in a large variety of styles.*

the corner paint store cannot fill your needs keep this in mind.

*Ready-made legs* for all sorts of furniture projects have been on the market for quite some time, but they have a limited appeal until you turn again to the cabinetmaker's suppliers. Here you can match period style in wood or metal to the project in the works. There is a superb collection of metal legs of exquisite beauty of design and workmanship. Ranging from ultra-simple modern design to the more elaborate and baroque styles, all easily attached by means of integral flanges, they open the way for the craftsman who wants to be different. With a choice of finishes from polished brass or English bronze to antiqued black or white on brass, these legs can be used with almost any wood finish, depending on the result desired. Some are reeded, others fluted and decorated in more elaborate style.

Round and square tapered legs of wood in the modern manner are also available, as is a set of Empire wooden legs. Most of the legs are to be had in an assortment of sizes, ranging from 6 inches in a simple wooden set to be used on a bed to 28 inches for table use.

Period and modern legs are also to be had in selected hardwoods to be finished

*Touch-type catch being mounted here allows door to open at a touch. Other catches among a wide variety available include (left to right in background) magnetic with no moving parts, roller catch and a conventional friction catch.*

Drawer pulls.

as you choose. In addition, tea wagon wheels are on hand, fitted with rubber tires, nickel plated hub caps, and oilless nylon bearings. Although generally called tea wagon wheels, their uses are almost limitless in the nursery, for patio furniture and anything else where mobility is a help.

*Working hardware.* Hardware that takes the work out of everyday living can be purchased at these supply houses, too. Turntables for everything from a lazy susan to a TV chair to rotary shelves for hard-to-reach corner cabinets in the kitchen make life easier and more enjoyable. The cabinet units can be had with or without a center pole, depending on your installation.

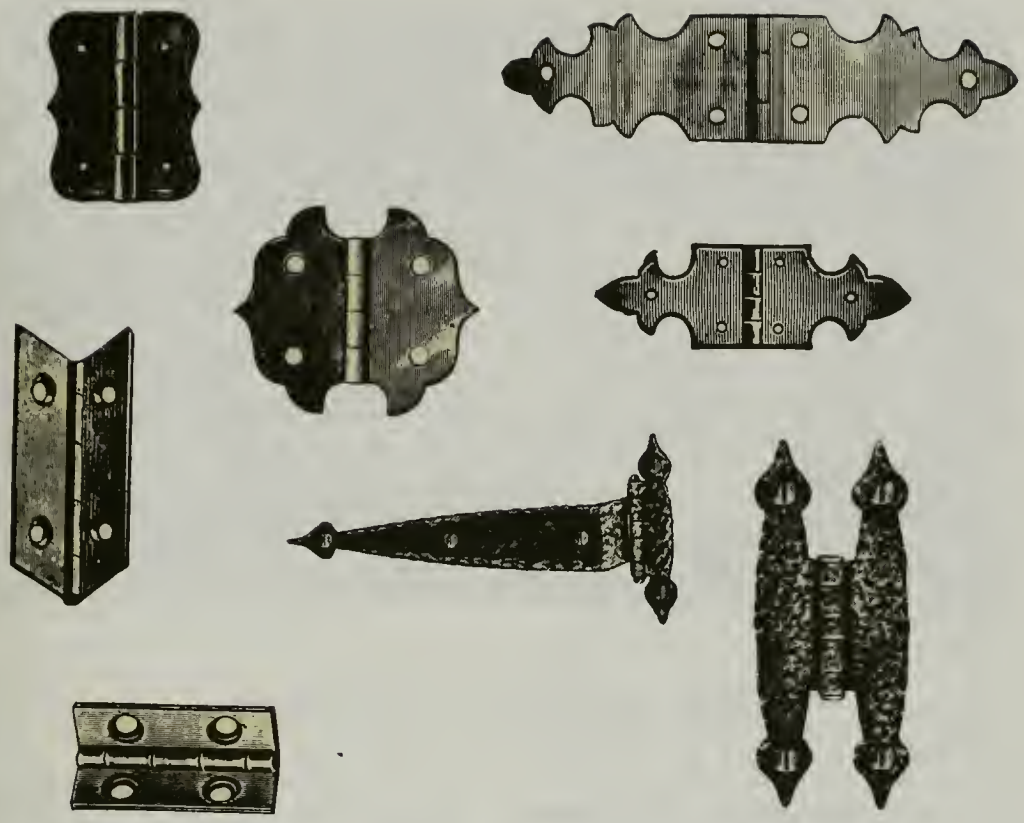
Folding legs for tables used occasionally, then stored away, can be had in a variety of styles. There are also folding brackets for tabletops that are suspended from a wall and drop to a flat vertical position when not in use.

Typewriter supports for a desk make it possible to conceal the machine on the desk door when not in use. Ballbearing rollers and an adjustable spring to offset the weight of the machine make for ease of operation of the unit.

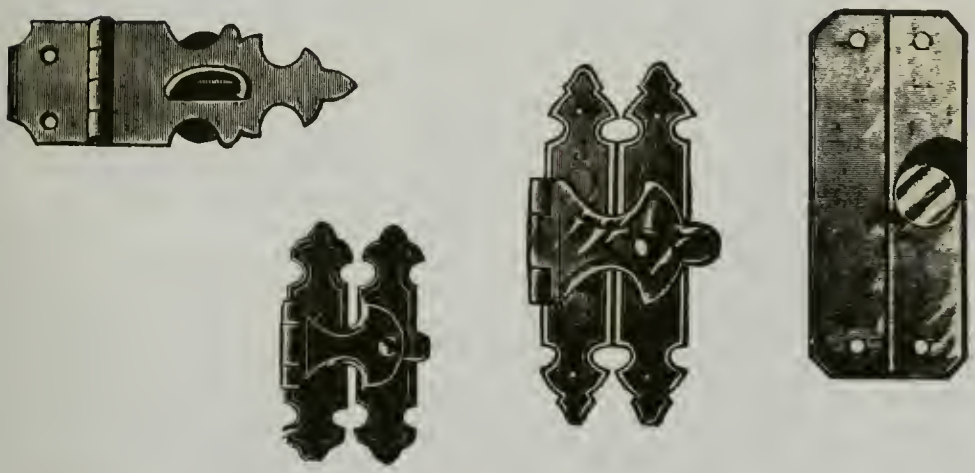
It is now possible for the home craftsman to buy platform rocker springs that convert an ordinary chair into a rocker without having rockers that protrude into the room and become a safety hazard. These units come in several sizes, according to the size and weight of the chair on which they are to be installed.

*Matching or duplicating antique hardware.* The cabinet hardware used by the homecraftsman is as important as the fine fit and finish of the wood parts. Whether it is as modern as tomorrow or a faithful reproduction of a period piece, compatible hardware is a must. There is a tremendous selection of these items. Pulls, knobs, hinges and key escutcheons in Early American, English Antique, French Provincial, and Louis XVI are but a few. The antique brass galleries found on delicate little tables are also available from these houses in a variety of patterns, both simple and elaborate. There also are solid brass moldings used as edgings for tables and desk tops, in designs that are matched to the pulls and hinges. Decorative finials and rosettes in varied designs and metals are in abundance. Most of these hardware pieces are in solid brass, with a choice of finish. Some may even be had in solid brass with gold plate.

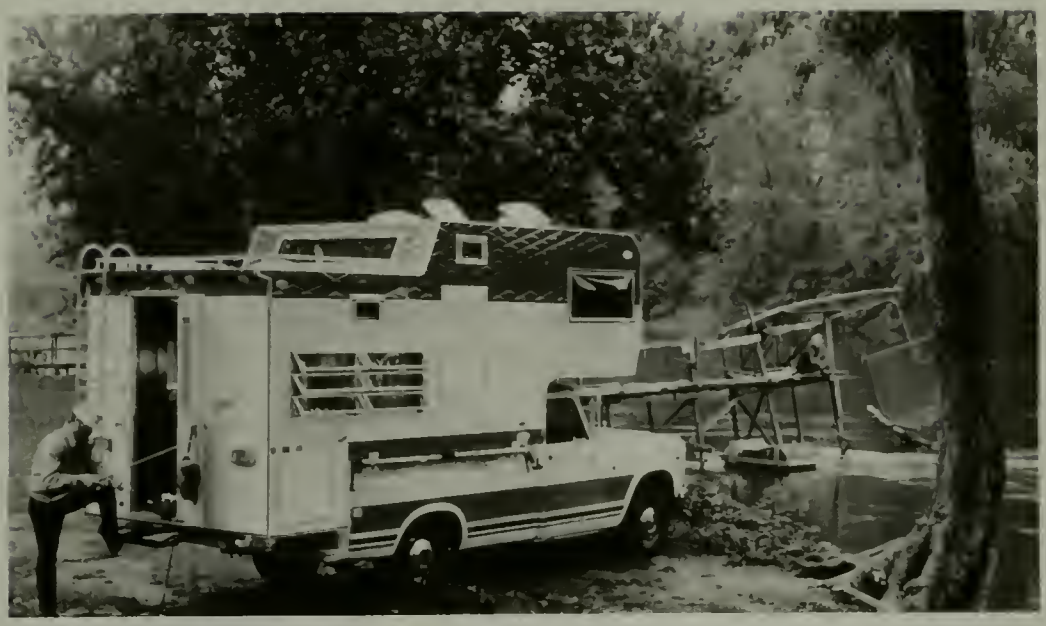
*See also:* INLAY WOODWORKING; FINISHING, WOOD; WOODWORKING.



Hinges.



Clasps.



# All about Campers

**Use this guide to choose the recreational vehicle that suits your needs, your family size and your budget**

A CAMPER is a vehicle designed as temporary living quarters for camping, recreation or travel. It may be towed—a trailer; mounted on a truck—a truck camper or pickup cover; or it may be self-propelled—a mobile home.

Often, campers are lumped together under the heading "recreational vehicles," although some, such as motor homes, are sometimes used for business.

*Which camper for you?* All campers offer shelter and almost all offer a minimum of an icebox and stove for food preparation. Beyond this, the variety of possibilities expands, making it possible for you to tailor your recreational vehicle to your family's size, budget, life style and travel plans.

The single most important consideration for most families is the amount of self-sufficiency offered by a recreational vehicle. A completely self-sufficient—the industry calls it self-containment—vehicle gives you all of the comforts of home with no dependence on campground hookups. Running water, stove with oven, refrigerator, lighting, shower and toilet are all on board. The ultimate in recreational vehicles even have heating, air conditioning and generators. You can go anywhere, anytime.

Naturally there's a price tag on all of this self-reliance. But, the initial investment can be cut somewhat with judicious planning. For instance, options such as air conditioning and generators can be added later, when you can better afford or have more need for them. If initial investment is your

**camper shower:** see shower
**camper trailer hitches:** see trailering

prime concern, make "add-an-option" your plan. Beware, though. Almost every option costs more to add after vehicle manufacture than it does during the manufacturing.

*Trailers* are the most popular type of recreational vehicle, or RV, and if your car, station wagon or truck can tow a trailer, this category offers the widest selection of prices and features. The least expensive camping trailer, with barely more than bunks and stove as standard equipment, will cost about $300. A fully equipped travel trailer can cost $20,000.

The biggest single advantage of a trailer is that it can be unhooked from the towing vehicle, freeing your car or truck for travel away from the campground. A secondary, yet important advantage is that you probably already own a car or truck capable of towing a trailer.

The disadvantage: you have to do some towing, which is more difficult than driving a car or truck by itself.

The least expensive trailers are the camping trailers. Often, families will buy a camping trailer to try out the RV way of life before buying a more elaborate camper. On the other side of the coin, some families trade in bigger RVs for a camping trailer because of its ease of towing and low operating cost.

Camping trailers usually have "soft" sides of canvas, although most now have a rigid main roof section, of either fiberglass or plastic. The entire trailer folds down and in for travel, and is folded out again whenever set up for camping.

The more compact camping trailers fold down low enough to give complete over-trailer visibility without special towing mirrors. Even the largest camping trailers are no higher than a typical sedan. This low towing profile offers little wind resistance. Coupled with the trailer's light weight, this means better gas mileage and better handling, compared with most full-size, "hard-sided" trailers.

Usually, only a simple SAE class I hitch is required for a camping trailer. (Before buying any trailer, check the type of hitch required. New vehicles with energy-absorbing bumpers may require hitch modification. Check with your *auto* dealer as well, because improper towing could void a new car warranty.)

The smallest of camping trailers will ac-

*Typical camping trailer. Sides fold inward and top collapses downward onto the trailer bed to form a compact unit for towing.*

▲ *This lightweight fiberglass travel trailer has a "back porch" that can be stowed for towing.*

◀ *A conventional travel trailer.*

▶ *Telescoping travel trailer expands for use.*

▲ *Lightness is achieved in this travel trailer by using aircraft-type monocoque construction, in which the aluminum skin carries a substantial amount of the stress that the structure receives.*

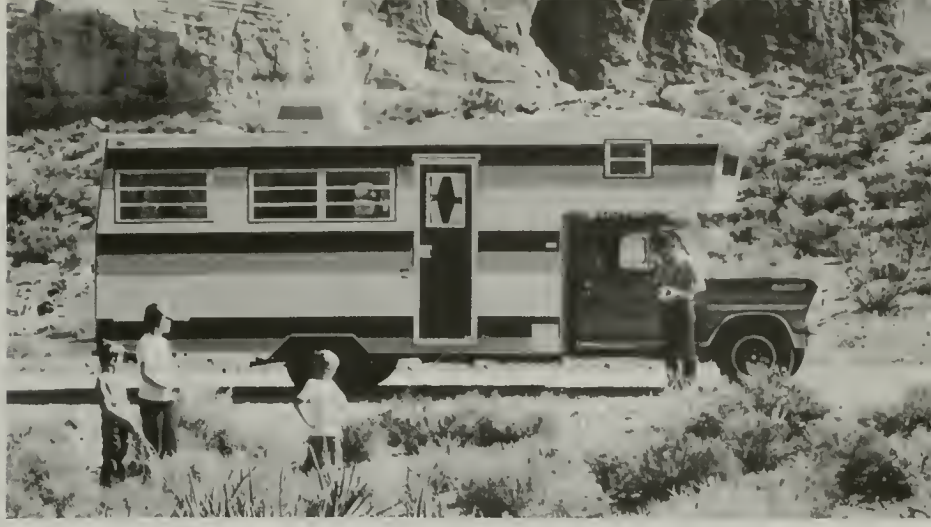
➤ *Fifth wheel trailer design puts the pivot between the trailer and the truck directly over the truck's rear axle. This makes handling much easier than it would be with an ordinary automobile-type hitch, in which the pivot is well behind the rear axle.*

▼ *Interior views of a fifth wheel trailer.*

*Top of the telescoping truck camper pops up to provide more than six feet of headroom. The top is lowered to reduce wind resistance when the vehicle is being driven.*

*Chopped-van mini-motor home is built on the chassis and cab of an off-the-assembly-line truck.*

*Interior of a chopped-van mini-motor home.*



➤ *A chassis-mounted camper.*

➤ *Full-sized motor homes, such as this one, are usually 20 feet or more in length.*

➤ *This motor home is 26 feet long. A smaller, yet similar version is 23 feet long.*

commodate a family of four; larger models will sleep up to eight.

With the exception of a shower, an LP gas oven, generator and air conditioning, all of the self-containment and luxury features of larger vehicles may be available in camping trailers, depending on model and manufacturer.

Standard equipment on many trailers is a mounted spare tire. Where it is offered as an option, be sure to have this extra wheel and tire. The smaller, non-standard tire could be difficult to find during a vacation, and the tire is a little more prone to flats.

Another worthwhile option is an awning and/or screen room, for outdoor eating in comfort and as an extended rainy-day living room.

Travel trailers range in price from about $700 to more than $18,000. And in that broad price range are broad comfort, size and luxury ranges.

When selecting a travel trailer, take your whole family to the sales lot. This is important, because you'll have to fit the entire family into the trailer.

*The driver's seat of a motor home. The size and weight of these vehicles make power brakes and power steering a must for ease of handling.*

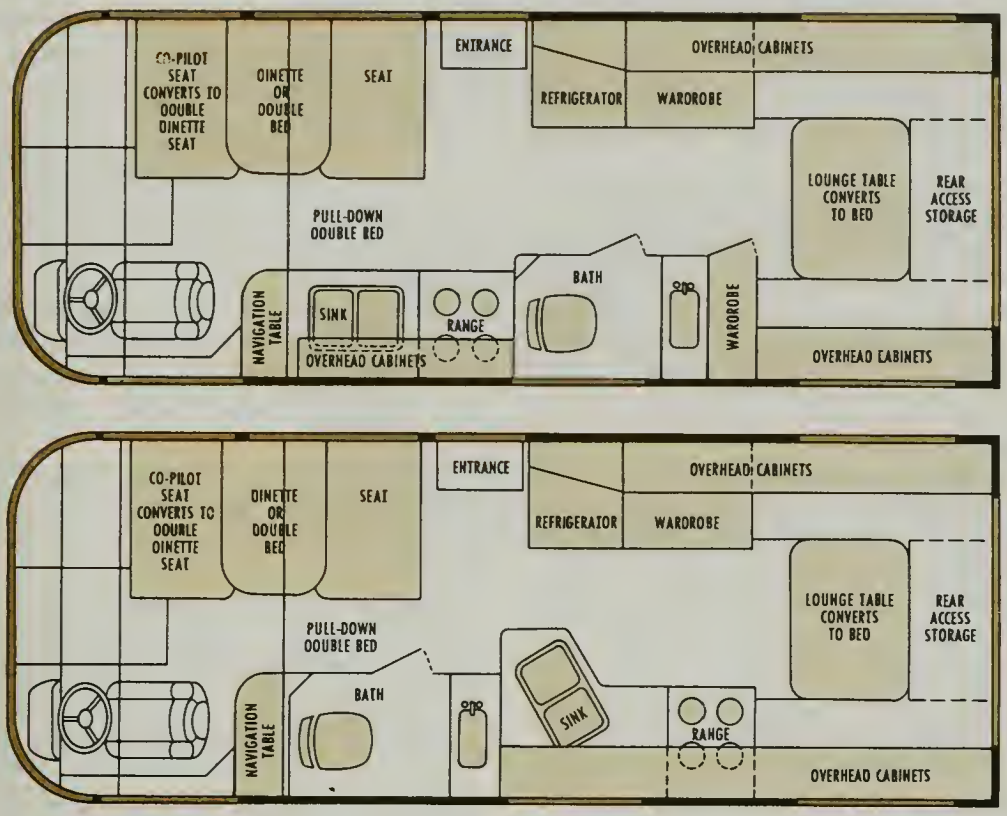
A hint: It's not enough for you to all sit around the dinette while the salesman does the talking. Have someone stand at the stove while others check out the bath, make the bed and look into the closets and heater compartment. Ask the dealer to show you the circuit breaker or fuse box. These activities will show you quickly whether or not the trailer is large enough for comfortable living, and whether the trailer has been engineered for cost or for convenience.

You must also consider auto size. You can't tow a 25-foot aluminum trailer with a low-horsepower sub-compact auto, but what *can* you tow? Here again, check with your *auto* dealer to protect your warranty. Beware of simple horsepower to trailer size equations: simple charts you may see usually don't take into account the axle ratio, cooling capacity, power options already operating from the engine, and other essential variables. One "guide" doesn't even say if the horsepower ratings are pre-1972 (gross horsepower) or post-1972 (net horsepower)!

When you get around to considering price, remember to include the cost of installing a good class II or class III frame-mounted hitch, with an anti-sway device if necessary. The proper hitch is essential for good handling characteristics as well as for safety.

On the subject of safety, it's also a good idea to look for the Recreational Vehicle Institute (RVI) seal next to the entry door. Although some trailers made by companies outside of RVI comply with the heating, electrical and plumbing safety standards put forth by the American National Standards Institute (ANSI), *all* RVI members *must* certify compliance.

While size, safety, price and self-containment features will be your main concerns when picking a trailer, also give thought to the type of construction. Conventional con-




struction is of prefinished aluminum or fiberglass over a wooden frame, all mounted on a steel chassis. Generally the profile is rectangular, though many streamlined fiberglass versions are on the market.

A more expensive design uses aircraft-type construction. Here, an anodized or polished aluminum skin is riveted to an all-metal frame and chassis. The rounded corners do more than streamline the trailer; the skin is designed to carry stresses in such a way that the shell supports much of its own weight.

If you wish to store your trailer in an ordinary garage, consider telescopic construction. This type is similar in appearance to conventional travel trailers, with one radical difference: The top half telescopes into the bottom half while you're towing or storing the trailer.

Fifth wheel trailers offer the ultimate in

*Interior of a motor home is shown in photo. Drawings illustrate typical interior layouts.*

towing ease because of the hitch and towing method. Most towing problems are caused by the placement of a hitch several feet behind the rear axle of the towing vehicle. The fifth wheel trailer hitch is directly above the rear axle, mounted in the bed of a pickup truck.

The "hitch" with this trailer is that you *must* tow with a pickup truck, an added expense if you don't already own the truck. In addition, few pickup trucks have enough seating room for an entire family, and it is illegal in most states for anyone to travel in a towed vehicle.

The number of self-containment and luxury features considered "standard" in fifth wheel trailers is quite large. Most manufacturers have taken advantage of the increased towing capacity of a truck and the towing ease of the trailer to make fifth wheelers larger and plusher.

In every other respect, fifth wheelers are similiar to conventional travel trailers.

*Truck campers.* Slide-in pickup campers or truck campers are mounted in the bed of a ½- or ¾-ton pickup truck. With special jacks, it is possible to remove the camper from the truck either in the campground or for storage, freeing the truck for other uses.

Pickup campers range in price from about $1000 to $5000, depending on size and degree of self-containment. In size, these RVs range from 6 to 11½ feet, not including the "cabover" section (devoted to a double bed) built into most campers.

A pickup camper offers at least a three-burner stove, sink, and ice box or refrigerator in the way of self-containment features. More sophisticated models boast complete self-containment, at least for a short time. (The camper-truck combination incorporates a good deal of waste space that would otherwise be used for bigger water and waste-holding tanks, oven and other features.)

If you choose a large camper, be sure the truck is a "camper special"—equipped by the manufacturer with the heavy-duty options that make driving with a camper easier and safer.

As with travel trailers, it is possible to get a truck camper constructed either of fiberglass or of prefinished aluminum; there are also a few telescoping versions on the market.

*Motor homes* are the fastest-growing segment of the RV market. These are considered by many people to be the top of the camper line, self-contained and self-propelled.

The cost of a motor home starts at a modest $4500, and from there the price can go up to $20,000 or more—the cost of a small house.

The least expensive motor homes are the minis—chopped-van mini motor homes, van conversions, and chassis-mount truck campers. Confused?

A chopped-van mini has been built on an Econoline-type van chassis on which only the cab portion of the van was originally provided by the truck manufacturer.

A van conversion mini started out as a complete van, but has had the roof and sometimes the sides modified to allow more headroom and room for self-containment features.

Chassis-mount campers have been built on a pickup truck chassis that has been supplied without the cargo bed. The cab portion of the truck is usually modified to allow access from the cab to the living area.

Chassis-mount campers and chopped-van minis usually have a sleeping area built over the driving compartment.

The mini motor homes in all of their varieties generally include all or most self-containment features, but because of their abbreviated size, these RVs contain less living area, and lower capacities in items such as refrigerator, closets, fresh water and holding tanks. Sleeping accommodations are limited to beds for four or six.

*Two types of pickup cover. Both the high and the low versions are easily removed from the back of the truck.*

Abbreviated size, far from being a disadvantage, is considered by many to be the biggest advantage of the minis. They're easier to handle, cost less to operate, and fit into smaller spaces than their larger cousins.

Full size motor homes are built for comfort and convenience. They are built on a variety of foundations: truck, bus—and motor home chassis. A typical motor home has a complete kitchen, complete bath (some include a full tub as well as shower!), sleeping accommodations for six, and high-capacity fresh water and holding tanks, LP gas tanks, refrigerator, closets—*everything*.

To help move this heavy load down the road, large engines, power brakes and power steering are usually standard equipment. The resulting package is surprisingly easy to maneuver on the road and in the campground.

One of the pleasures of a motor home is noticed only on the road—the whole family can travel together in comfort and safety. While one person is driving, another can be sleeping, and the children can be enjoying a game of Monopoly at the dinette. You don't have to stop for trips to the bathroom, and everyone can stretch his legs whenever the mood strikes. Switching drivers takes only a moment, and the driver is in for a treat: he's up above the traffic with greatly improved visibility ahead.

*Pickup covers.* For the avid sportsman with a small RV budget or a stay-at-home family, a pickup cover may be the RV of choice.

Self-containment here is almost nonexistent, and only shelter is offered. Prices start at about $200 and range to about $1,000.

A pickup cover encloses only the area over the bed of a pickup truck. The least expensive units are windowless shells with one entry door and perhaps not even a light or bunk. More expensive units include insulated, paneled walls, louvered windows and interior lights. Bunks and storage cabinets or racks round out the list of possible accessories.

Whatever RV you pick, you'll be moving into a more rewarding, more mobile, more comfortable way of life. The nomad never had it so good.

*See also:* CAMPING; CAMPING EQUIPMENT.

# Tailgate Extension for Your Van

## Build this inexpensive, stowable platform to serve as a table or extra bunk

An inexpensive homemade conversion can serve as an additional bed for a child by night and a large easy-access table by day. It can provide approximately 3 x 3 feet of additional floor space, and in terms of a van camper or station wagon it means added comfort.

The simple table comes in very handy when a cooking surface, folding table, or other clean, large surface is needed. It is easy to make from a piece of plywood covered with formica. Aluminum edging strips are put around three sides for the finished look. The two legs are hinged for easy storage. The table is held in place by two slide bolts which anchor into two small holes drilled near the back gate. The easy storage is accomplished by unbolting the two slide bolts and folding the legs under. The whole assembly is then stored under the cushion.

*To make table:* Measure the place in which it will be stored and also the size of tailgate. For a VW van the table can be 34 inches long by 39 inches wide (approximately same as the cushion). Place slide bolt near each side (see photo) where they can fasten into a small hole drilled in van. If van has closet it will be necessary to make folding extension arm for bolt. For height of legs measure from underside of table to ground when vehicle is level. The legs made of 1½- or 2-inch stock are fastened to table with hinges. They run about 37 inches for the VW van, and it is wise to keep blocks for leveling legs.

Materials are available at any building supply store or lumber yard.

The table has added dimension when a tent is made of inexpensive waterproof duck. Since this tent-like cover makes the addition enclosed as part of the vehicle, it can be used as a child's bed, an extra long bed, or just additional room in case of rain. The cover is attached by means of snaps (like the ones that are used in van campers). In fact, it can be snapped across the top where the bug screen fits. Additional snaps are placed under the table, and a zipper is installed for easy access. The tailgate of the van helps to hold the tent

*Above, slide bolt in right-hand side of tailgate opening is vital for holding table in place. Folding extension arm for bolt is necessary if van has rear closet. Top right, canvas is quickly removable to convert extension to table, bottom right. The unit fits under the seat, is two inches high when stowed.*

rigid. The cover folds and stores under table extension while traveling. The canvas cover will require careful measurements and patience.

*To make canvas cover:* Measure and cut four panels—sides and top. Approximate measurements for a '69 VW are: Sides: 33 inches long at top, 34 inches long at bottom, 36½ inches tall. Zipper entrance side: 50½ inches at top, 48 inches at bottom, 36½ inches tall. Top: 33 inches long, 50½ inches wide. Be sure to allow for snap tuck flap under table and flap to reach snaps inside van. Sew inside on the five edges where canvas meets canvas. Hem edges, leaving flap for snaps. Place snaps so that they will meet snaps inside van and under table (mark in place before installing). Put long zipper in back panel. Screen windows can be added to each side. J.B.

*See also:* CAMPING; CAMPING EQUIPMENT.

*First requirement is a sharp axe and knife. Tinder is made by shaving a stick of wood with knife. Other sizes are cut down from slab.*

# Anatomy of a Campfire

## Here's how to get a good cooking fire started using just one match

YOU CAN LIGHT A CAMPFIRE without dousing it with gasoline or kerosene or starter fluid, and you can do it with one match, even if the wood is damp or green.

You need an axe, a pocket knife and, of course, a match. The wood supplied at campgrounds is usually lengths of log or mill slab. Mill slabs are the outside pieces of the tree trunk that are discarded when the log is squared off into timber.

First, use the axe to split the wood into sticks one-inch thick. Then, split some of the one-inch pieces into half-inch pieces and some of the latter into splinters. Then, with a knife, whittle a sizable pile of wood shavings. This is the tinder.

Crunch the tinder gently into a lump in your hand, so that your thumb leaves a depression in it. Put the lump down so the depression forms a little cave. The cave is for the match.

Lay the splinters crisscross over the shavings and place some half-inch sticks over the splinters in the same way.

Light the match and put it into the cave so the flame rises into the pile of tinder. The shavings will burn, drying and igniting the splinters. The splinters will start the half-inch sticks and so on. Start putting on the one-inch thick pieces.

The secret is starting small and covering every flame that escapes from the pile with another stick of wood. Don't let a flame waste itself heating empty air.

A cooking fire must be deep, so keep piling on slabs until they almost stand upright. Block every flame that escapes with firewood.

Most of the wood must be split so it will turn into coals rapidly, if you're building a cooking fire. Most slabs are 18 inches long, and a two-foot diameter fire will result if care is taken in placing them so that none fall backward as they are consumed.

**campgrounds:** see camping
**campgrounds, emergency:** see survival

▲ *Place tinder at bottom of fire, then stack smallest sticks above. Work up in size gradually to sticks twice as thick as your thumb, then light.*

▲ *When fire blazes, stack larger wood; attempt to block all flames. Be sure you have enough wood this size on hand before you even strike a match.*

▲ *When the kindling starts burning well, stack the heavy wood. A good bed of coals takes one hour to build, but is best-working cooking fire.*

▲ *When finished, don't just put your fire out (top)—preserve wilderness values by making all traces disappear. Bottom photo shows proper disposal.*

It takes about an hour for a fire of this kind to be reduced to a bed of glowing coals, but it will be six to eight inches of intense heat.

For a social fire, wait until the basic fire is burning strongly. Place a few sticks crossways over the fire so that instead of burning from the end, each burns from the middle, adding a few slabs occasionally to brighten up the darkness. H.K.C.

*See also:* CAMPING.

# How to Choose Campfire Wood

## Make the best use of wood native to campgrounds in your part of the country

ALTHOUGH THE QUESTION of the best woods for a campfire appears simple, it has a lot of ramifications. It can't be answered by just rattling off the names of a couple of hardwood species and letting it go at that.

It might even be argued the question is academic, since the best kind of wood for a camper is whatever is available. That's why somber recommendations advising campers to use only this or that kind of wood have an amusing note. Maple might rank as the best firewood because it heats well green or dry and furnishes a fine bed of coals. But such choice wood is often hard to come by and on some campsites it's just not available. So no matter how desirable it might be, it's of no use to some campers.

Furthermore, camping—for some at least—involves making do with what's available. That's what you must do with wood. Use what's there. Insist on a certain kind because some expert recommended it and you won't have a fire at all.

Maybe today's camper has little need to "know wood" anyhow. Probably nine out of ten campers either have no use for wood or figure themselves much farther ahead to use portable gas stoves or the permanent installations in camping vehicles.

Since wood is often furnished by the regulating agents on formal campsites in an effort to keep tourists from hacking up everything in sight, again it's a matter of taking what's available.

Thousands of people enjoy a wide variety of types of camping. So wood may be used in a stove to heat a deer hunting shack; to bake pies in the cook stove oven; to provide light and warmth on a beach when a boat is moored; to heat a tent; or to provide a gathering place around the fireplace of a fisherman's cottage and so on. So it isn't just a matter of the boy scout type campfire or the woodsman's cookfire.

If camping in Wisconsin, Michigan, Maine or other heavily wooded states you probably can be selective because there'll be a choice of wood. But you might have to make do with driftwood when on the shores of big water or with one of the fast burning, spark throwing conifers at the tree line's edge in Canada or the mountain states.

Pioneers crossing the plains fueled their

cookfires with dry buffalo dung (euphemistically called "chips"). It's doubtful today's campers will utilize anything along those lines, or burn straw in their heating stoves, but desert campers who want a fire may find that mesquite is the only "wood" available.

If you have a choice of wood, bear in mind these generalities. The conifers (pine tree types) will give you quick ignition and a fast hot fire, usually accompanied by sparks and soot. The preferred hardwoods, maple, oak, hickory etc., won't "catch" as easily but once underway will burn long and steadily and provide hot coal beds.

For example, if you want to take the chill off the cabin in a hurry or dry out some clothes, stoke your fire with dry pine or cedar. If you want a clean fire to cook over and one that will provide still hot coals to fan up in the morning, turn to the hardwoods.

Avoid cutting down living trees. Top woods will burn well even when green and virtually any wood will burn if added to a hot enough fire. But dry wood almost always provides the more satisfactory fire. This can be obtained from snags, blowdowns that are not flat on the ground, dead trees and the lower limbs of such trees.

The permanent camp, such as a cabin used for hunting or fishing, or the site where outdoor living may be enjoyed for a considerable period of time, is the exception to this rule. Then selected trees should be felled, sawed into fireplace or stove length and split, if necessary. The cut and split wood is then piled to cure. Late winter and spring is the best time to do this and a supply of good, properly cured firewood will be available for fall and winter use.

When the "wood cutting party" is sent ahead to prepare camp, it should be concerned with cutting replacement wood for that already prepared which will be used during the camping period, not with stacking up a bunch of green logs for immediate use. But use up wood cut 6 to 18 months before. Don't save it. Cut wood will deteriorate in heating quality if unused too long and some popular camp woods, such as white birch and poplar, get "punky" quickly. However, oak does a better job after two seasons of drying.

In rating various woods either "good" or "bad," it makes more sense to classify them according to the use they are to be put. Furthermore, some of the best heating woods are tough to chop and split and this can influence a camper in judging what wood is best for his particular use.

Campers probably will use wood in three kinds of fires; on the ground in the open, in a fireplace or in a stove of some sort.

When considering stove wood, you don't have to be too fussy about what kind of wood you cut. Virtually anything, including camp debris and garbage, can be consumed in a cook or heating stove in a cabin, shack or tent. Sparks aren't much of a problem and "sooting up" doesn't affect cooking utensils. Anything that burns can go into a stove; the poorer quality stuff is mixed with the hot fire material to make sure it's all consumed and gives off heat.

Slow fires and frequently used green wood will require cleaning pipes and chimneys. Use the scrap wood and less desirable quick burning stuff when tending the stove during the day and put in your maple, oak, beech, hickory and other "good" wood when you want to bake or keep fire overnight.

Green chunks put on a bed of hot coals in the evening will simmer and hold fire a long time. But a faster, hotter fire that will heat and then hold for a time for cooking is best provided by "limb wood," the small in diameter, unsplit pieces salvaged from the smaller limbs of downed hardwoods.

Fireplaces, on the other hand, provide not only heat, but there's something about a good looking log and a pretty flame that

transcends the strictly utilitarian. There's just something about an open fire that's warmer.

Perhaps for that reason white birch is a popular fireplace wood. While acceptable, it's overrated and favored mostly by people who want a pretty picture setting off their living room but seldom light a fire. Yellow birch, while not as easy to chop and split or as pretty in appearance, is superior in heating quality.

Maple, hickory, beech and oak are other fireplace favorites. Large logs simmer and glow like a blacksmith's forge, the clean blue and red flames throw a glowing heat and are great to dream by. Ironwood (hornbeam), and white ash are other top heating woods, but black ash is mediocre, not much better than slippery elm, soft maple and basswood for fireplace wood.

Since sparking can be a danger in a fireplace (except for kindling and a spectacular start to get hardwoods going) coniferous wood should be avoided in fireplaces except when it's under observation.

The length of the fireplace log depends upon the size of the fireplace. Naturally cutting stove wood or short fireplace lengths requires more labor. Logs cut from limbs, or from small trees with trunks up to six or seven inches, need not be split. Anything larger should be halved or quartered to facilitate proper curing, a quicker "catch" and for ease of handling.

Outside, the open fire is either a bonfire type for sitting around or a small, low blaze affair for cooking. Either may be converted, through reduction or increase in size, to a reflector fire for warming an open-faced tent or lean-to.

The big fire for sitting around is best fueled with a quick burning wood to get a hot, fast start so that the longer lasting hardwoods to be fed in later will catch readily. If a camper has an aversion to axe and saw work, this type of fire can be what is sometimes referred to as a "Kain-tuck fire." Larger limbs aren't cut in usable lengths, but simply thrust into the heart of the fire and pushed in again each time the end burns up.

Cookfires, because they are small, should be fueled with small hardwood pieces that leave a good bed of lasting coals and burn with a minimum of smoke and soot. Then, when fresh wood must be added during the preparation of a meal, utensils and the cook won't be blackened. Here again are hickory, maple, oak, white ash and ironwood getting the nod. If you use birch, wait until the bark is completely burned before setting your utensils on the fire. While excellent for starting a fire, birch bark's oily smoke can create a mess.

The resin in the conifers also knocks them out as preferred cookfire wood. Nor do they leave any lasting coals to cook over. One of the reasons for cooking on coals is that you have less scouring to do than when heating with flame.

Two common woods, poplar and oak, are frequently underrated. Oak has its critics as a "dirty" wood to handle and when burned green is a quick flue clogger. But dead oak is frequently available and takes quite a bit of lying around on damp ground before it gets punky. There is a difference between dry dead wood and the punky stuff that only smolders and gives no heat.

Campers should certainly have some compunctions about felling some of the more valuable hardwoods like maple and beech, but the often scrubby oaks have little commercial value. There are many sub-species of oaks, but it's safe to say that any the camper will encounter will make good firewood and give long lasting heat.

Poplar (aspen) is known as "popple" in the northwoods and can be burned in a hot fire when green. When dry it provides a quick, hot fire of its own with a minimum of smoke. It's light, easy to "make" and

handle. Many times it's the only wood readily available. But downed popple in contact with the ground is usually a poor bet, for it quickly degenerates.

Making fires has an article of its own. But for a starter, just don't make the all too common mistake of starting too big or trying to add big chunks or logs too early. Get the fire going well with the small stuff and then it will take hold of the larger hardwood fuel.

Sportsmen with a permanent camp, like a cabin, or headquartering out of a trailer, camper or tent on vacation property will do well to take a gunny sack of lumber scraps to camp, or haul up some old cedar fence posts for sawing up and splitting into kindling. Good, dry kindling is basic for firebuilding.

Some characteristics about certain woods should be known to you to help you decide whether or not to use them, if you have a choice. For example, you'll probably run into trouble working on ironwood with an axe. It's as tough as its name. Use a saw.

White cedar and the conifers all chop and split easily. So does white birch. Yellow birch is a tougher proposition but worth it. Basswood (linden) also chops and splits easily, is light to handle and makes good kindling when dry but is a poor burner when green. Beech splits best when green. Oak can give you some splitting trouble and elm is very frustrating. With hard to split woods the job can usually be done easier in bitter cold weather. A rule of thumb might be to chop and saw in thawing weather, split when it's freezing.

Hickory is tough to chop but splits well when green. It ranks, along with maple and white ash, as a top wood for camping use. All are relatively easily worked and give hot, clean, long lasting fires.

When possible, stay clear of hemlock, tamarack and box elder. Don't load a stove with tamarack or you risk burning out a grate. Willow is worthless except as a backlog, reflector or support.

Other oft-recommended woods are black haw, cherry, holly, locust, mulberry, Osage orange, persimmon, walnut and chestnut.

If you'll need much firewood, you'll make a lot of work for yourself if you depend upon an axe exclusively. Saws are also safer in beginner's hands. Every camp should have at least a small buck-saw (also known as a bow saw and a Swede saw) for bucking firewood. And a two-man crosscut may be utilized for the big jobs. Sure, if you can afford it, a power saw will do everything quicker, but fuel, bulk, weight and mechanical failure have to be considered.

Finally, don't be too eager to get out in the woods and start flailing around with an axe. You may ruin and not utilize a valuable standing tree and there is a certain risk involved when a neophyte uses an instrument to which he's unaccustomed.

There is usually wood available that doesn't have to be cut. Commonly called "squaw wood," this is the trash and slash that has been downed (tree tops, for example) but isn't lying on the ground. Driftwood is often useable.

This pickup wood can be broken off, snapped over the knee or laid with one end up on a log or rock and stamped on to break into proper lengths. When breaking wood in this manner, always be sure to hit it with your heel. You'll raise hob with your foot if you tromp it with your arch. Large and unbreakable pieces can be fed into a fire, "Kaintuck" style, after it gets going. There's usually enough of this to supply most camps.

There's no cut and dried answer to "what's the best wood" or how to go about finding it and cutting it. But this should give you a start on "making do" with what's available. D.D.

*See also:* CAMPING; CAMPING EQUIPMENT; OUTDOOR LIFE.

# How to Get Started Camping

## Don't plunge in, wade in gently with this easy plan

THE SMART WAY to start camping is not to plunge into it. Sneak up on it instead. Build your camping world gradually, piece by piece. Start now, tomorrow, or at least next weekend. Where? How about your own back yard? In fact, that's probably the best place to start anyway.

Most potential campers approach the subject by thinking of shelter first. But man can survive without shelter, not without food. And food is an easier and more immediate route to follow in building your camping expertise.

In an oversimplified way, camping is nothing more than a series of overnight picnics, all strung together. Picnic right in that back yard as a starter, forcing yourself to use foods and equipment that would seem to be compatible with a camping trip. Later, plan day-long picnics—making trips to a local park, nearby lake or seashore, or just a pleasant spot you like. Start early, cooking breakfast after you arrive. Remain to cook a late afternoon dinner, leaving time to return home afterwards.

*Start with the basics.* Two common pieces of camping equipment are just as appropriate on a picnic—the camp stove and a large ice chest. Consequently, an investment in either is rarely wasted. More important, these are really all you need to start your initial practice.

*First step, opposite page, is a series of backyard cookouts, using same foods, stove and gear you will use in camp. Left, staking out wall tent for backyard practice. Even this is an adventure for youngsters. They take over, below. Trial runs such as this give everyone practice, save time afield.*

Experiment with perishables stored in the cooler. Supplement these with packaged meals no farther away than your supermarket shelves. Lipton and Kraft both offer an interesting selection. Be sure to include a variety of dehydrated or freeze-dried camp foods as well. If you can't find these locally, write to Chuck Wagon Foods, Woburn, Mass., for their excellent mail order list. Open-fire cooking is all right if you want to play pioneer. But generally this kind of cooking, except for grilling hot dogs or hamburgers, takes

*Left, Spray new tent to check waterproofing and to expand fibers. Smaller tents such as this two-man pop tent are good for canoe trips and to supplement space in larger tents or camping trailers.*

**camping boots:** see camping equipment

more acquired skill and is better reserved for later. Do some testing with your cooler in between trips to learn how much it will hold of various types of food and how long a specific amount of ice will last. You'll find that ice blocks outlast cubes and cool just as well. Make your own blocks by filling different sizes of plastic containers with water and setting them in the freezer for about two days.

A single summer or less of picnicking or beach trips should teach you almost as much about camp cooking as that possessed by an experienced road-runner.

Then, somewhere along the way, you'll be ready to begin acquired know-how on shelter. And if you work it right, you still won't have to *buy* anything. Many camping centers will now *rent* everything you need. Shop around for a dealer who will rent you some basic equipment for a weekend only. This could include a tent and whatever you don't already have among such necessities as camp stove, cooler, lanterns, air mattresses and sleeping bags. Not all dealers will rent sleeping bags, however. Use one day to practice setting up the tent in the back yard so there will be no surprises or difficulties in store when you arrive in camp.

A GOOD CAMPER
KEEPS AND LEAVES A CLEAN SITE
BURNS ALL FLAMMABLE REFUSE
PACKS OUT NON-FLAMMABLE REFUSE
NEVER CUTS OR SCARS LIVE TREES
KEEPS HIS CAMPFIRE SMALL
NEVER LEAVES FIRE UNATTENDED
MAKES SURE HIS FIRE IS DEAD OUT

▲ *Park reminder about salety, and you're already camping out!*

Another way of handling the problem, still by renting, involves a completely self-contained package on wheels. Camping trailers with fold-out bunks are available from several manufacturers. These come in various sizes to sleep families anywhere from four up to eight. Some models include a camp stove, cooler or refrigerator, sink, even a sanitary toilet of the Porta Potti type.

The foam padding on the fold-out bunks allows you to get by without either sleeping bags or air mattresses. Just bring along a few blankets. If you visit the dealer beforehand, when he isn't too busy, he's usually only too happy to give you a course on how all the equipment works.

With a reasonable backlog of picnic cooking and weekend experience under your belt, you should then have gained the knowledge and confidence for a longer trip—again, not too far from home. Once established in a regular campground, you'll have the opportunity to drift around and talk with other, more experienced campers, observing their equipment in actual use, asking for opinions and noting what sounds like the best gear for you.

*Shelter comes next.* A good choice is the tent as housing for beginner campers. First, tents of any size cost less than other types of camping shelter. Second, the tent is the most versatile, will go more places, is easier to store, and can always serve as a useful supplement to more sophisticated types of shelter you might obtain later on.

A single tent taken on any trip should be large enough to sleep everyone, with enough space remaining for storing other equipment and to provide a walkway between sleeping bags.

A good rule of thumb is to multiply the number of campers in the party plus one,

by 18. The result should be equaled by the floor space of your tent in square feet.

Starting out by the tent method requires separate necessities such as camp stoves and ice coolers. Should you later move up to some sort of self-contained camper on wheels, these will still prove useful as spares, or for cooking outside the wheeled camper. You can save money on the purchase or rental of a camping trailer, for example, by getting one without these accessories and merely using those you already have. Simple tent trailers match up perfectly with previously owned tents and camping gear—adding both housing and transportation capacity without unnecessary duplication of equipment.

*Sleep better in bags.* On the subject of sleeping comfort, air mattresses come closest to duplicating your own bed. Canvas camp cots tend to be hard, uncomfortable and colder in cooler weather. Double-decker cots do save space in a wall tent, but use air mattresses on top of the canvas.

Sleeping bags with two or three pounds of polyester-type filler are adequate for most summer camping. Don't pay the extra price for a king-sized bag unless you are a king-sized person. Bags with a cut of 36 x 75 inches are roomy enough for most adults up to six feet in height. Remember, too, that it is the thickness of the bag's fill that determines its warmth, not its total weight. Consequently, a 4-pound rated king-size bag may be no warmer than a 3-pound regular-size bag.

You might eventually consider something like the Coleman 6-pound "Tri-Temp" bags. These *are* king-size, but for a practical purpose. They are so constructed that you can have one, two or three layers of insulation above you, depending on whatever the temperature dictates. For warm weather, the same stacked construction permits zipping out the insert to be used as a 2-pound single, and opening the remaining part to a double (or even triple for children) bag of 2-pound rating. As a result of this versatility, one bag will sleep three to four persons in warm weather, or provide excellent warmth for one person during cooler periods.

When shopping for initial camping equipment, it's safest to look for familiar, nationally known brands. Large, well-stocked sporting goods dealers or camping centers will provide the broadest selection of equipment types. Remember, too, that by timing it right, you can save up to 20% or more by hitting the off-season sales.

*You're ready, now travel.* Where should a beginner go? Why not try to visit nearby private and public campgrounds during the pre-season period to find one whose layout and facilities you like. Check the national campground directories for an idea of what is available in camping styles and recreational opportunities within reasonable distance. Ask experienced camper friends about spots they've already visited.

Finally, much can be learned from a good book on camping, if you can find one that is practical rather than superficial.

Someday, you may wish to move up to the larger trailers or motor homes for distance touring—to take a crack at wilderness camping, winter camping or backpacking. But the way to start is to start simple.

R.D.

*See also:* CAMPERS; CAMPING EQUIPMENT.

**WHERE TO FIND IT**

Lipton and Kraft offer an interesting selection of packaged meals available at your supermarket. Chuck Wagon Foods, Woburn, Mass. 01801, has an excellent mail order list of dehydrated and freeze-dried camp foods.

Recommended reading materials include *America's Camping Book* by Paul Cardwell, Jr., published by Scribners; *All About Camping* by W. K. Merrill, published by Stackpole; *Outdoorsmen's Handbook* by Clyde Ormond, published by Dutton; *Aid To Campers* published by Davis Publications.

*Camping Journal* provides tips on where to go and the names and addresses of state agencies to contact.

# Camper's Check Lists

**Modify the checklists here to suit your own needs, then use them to keep from forgetting some essential item, or from packing too little, or too much**

CHECK LISTS are the camper's guideline. The check list can make an orderly procedure out of an otherwise haphazard enterprise, and lend self-confidence even to the beginner.

But a check list, like a toothbrush, is a personal thing. One camper's essential may be another's burden. The best check lists are those you can make up at the end of a trip. Although this procedure doesn't help on your first camping vacation, it will help with the next.

One of the better reasons for proceeding according to a check list is to avoid packing more items than you need. Too often the camping family loads down its vehicle with everything it could possibly use and just prior to departing, begins thinking of additional items. These become burdens to be loaded, unloaded, and moved with each stop, and perhaps never used during the trip. The list then, providing it is a good one, becomes a reminder of what not to take as well as what not to forget.

Seasoned campers understand that there is a direct relationship between a camping check list and organization. One family that traveled with a north woods guide for a week recalled later, with some surprise, that all week they had not found themselves short in supply of any needed commodity. When he packed out for the trip, the guide had gone over his pack with great care, occasionally referring to his own tattered check list, worked out over years of outdoor living.

One pack contained all the pots, pans, and utensils. Another held all the items that might be damaged by water. By the end of the trip the guide had used up nearly all of the edibles. But there had been enough to last through the final meal because that was the way he planned it.

This matter of planning can be carried beyond the camp kitchen. If the family tent is stored in a tent sack, the same sack might also hold the plastic ground cloth, tent stakes and canvas patching kit. Everything that is needed together, travels together. On a long vacation outing, however, it is always good planning to check such a pack before departure and reassure yourself that all items are present and in good condition.

Likewise, spare parts of the camp stove can be taped or wired inside the stove, and the spare mantle for the lantern can be taped to the bottom of it. The secret of such organization is to assemble equipment in related groups then put smaller items into larger packs, always within the limits of practical handling and packing.

This automatically eases the strain on

| TRAVEL TRAILER CHECK LIST | | |
|---|---|---|
| Hydraulic jack | Red signal flags | Tire pump |
| Emergency lantern for outside use | Flashlight, standard with extra batteries and bulbs | Spare tire |
| Folding chairs | Flashlight with red signal flasher | Tire tools |
| Tent fly or awning | Funnel for water tank | Air gauge |
| Axe | Funnel for gas tank | Tool kit |
| Broom | Gasoline can | Tow rope or chain |
| Mop | Flexible spout for gasoline can | Wheel chocks |
| Sponges | Sewer hose | Fuses for car and trailer |
| Detergents | Hose, 25″ for water tank | Tape |
| Buckets | Dishes | 50′ of extension cord |
| Fire extinguishers | Dishpan | Water can |
| First aid kit | Bedding | Bubble level for leveling trailer |
| Flares | Pillows | Spare light bulbs |
| | Long-handled shovel | |

| BACK PACKERS CHECK LIST | | |
|---|---|---|
| **Essential Equipment** | | |
| Knife | Waterproof matches | Packed bag |
| Flashlight | 50′ nylon cord | Sleeping bag |
| Compass | Back pack | Maps |
| Canteen | | |
| **Extra Clothing** | | |
| Underwear | Light socks | Plastic raincoat |
| Heavy socks | Thermal underwear | Jacket |
| **Personal Articles** | | |
| Toothbrush | Small towel | Sunglasses |
| Toothpaste | Soap | Suntan lotion |
| Mirror | Soap Dish | First aid kit |
| Washcloth | Shaving equipment | Toilet tissue |
| **Extras** | | |
| Air mattress | Stove | Grill |
| Trail axe | | |
| **Cooking Equipment** | | |
| Nesting pots and pans | Tin cup | Aluminum foil |
| Fork and spoon | Can opener | Plastic bags |
| Tin plate | Scouring pads | Dish cloth |

## AUTO CAMPERS GENERAL CHECK LIST

| | | |
|---|---|---|
| **Shelter** | | |
| Tent | Poles | Plastic sheet for rain protection on windward side of dining fly |
| Screened tent fly for dining area | Stakes | Floor mat |
| Ground cloth | Canvas repair kit | Broom |
| Ropes | | |
| **Bedding** | | |
| Sleeping bags | Air mattresses or | Pillows |
| Bag liners | Foam mattresses | Plastic cover for pillows |
| Extra blankets | Air mattress repair kit | Carrying cases for sleeping bags |
| Ground cloth | Air mattress pump | Zipper repair kit |
| Cots or | Mosquito net | |
| **Kitchen Equipment** | | |
| Can opener | Grill | Bucket |
| Measuring cup | Charcoal | Insulated water jug |
| Pancake turner | Gasoline can | Plastic food containers with lids |
| Spatula | Funnel | Eating utensils |
| Tongs | Propane | Paper cups, plates, napkins |
| Griddle | Matches | Paper towels |
| Skillets | Long-handled fork and spoon | Aluminum foil |
| Pressure cooker | Mixing bowls | Camp stools |
| Folding oven | Nesting cook set | Folding table |
| Reflector oven | Coffee pot | Table cloth |
| Camp stove | Dutch oven | Clamps or elastic for holding table cloth |
| **Cleaning Equipment** | | |
| Detergent | Dish mop or sponge | Dishpan |
| Scouring pads | Cleanser | Towels |
| **Camp Tools** | | |
| Axe | Screwdriver | Knife |
| Saw | Pliers | Lanterns |
| Clothesline | Mantle lantern | Shovel |
| Clothespins | Hammer | Sharpening stone |
| **Automobile** | | |
| Desert water bag | Tool kit | Warranty certificate |
| Fire extinguisher | Emergency light | Battery and tire guarantees |
| Tow rope | Auto registration | Extra fan belt |
| **Personal Equipment** | | |
| Shaving kit | Towels | Insect repellent |
| Soap and soap dish | Wash basin | First aid kit |
| Toilet tissue | Mirror | Suntan lotion |

| AUTO CAMPERS GENERAL CHECK LIST | | |
|---|---|---|
| **Clothing** | | |
| Hiking shoes | Hiking trousers and shirt | Rain gear |
| Extra socks | Windbreaker | Sewing kit |
| **Recreation** | | |
| Binoculars | Playing cards | Portable radio |
| Cameras | Fishing tackle | Stamps and stationery |
| Film | Games | Notebooks and pencils |
| | Swim suits | |

| CAR OR RECREATIONAL VEHICLE CHECK LIST | | |
|---|---|---|
| Lubricate and change oil | Check all tires for wear and cuts | Check muffler and tail pipe |
| Complete check of transmission, differential, brake systems, steering, oil filter, air cleaner | Consider motor tune-up | Have wheel alignment and bearings inspected |
| Check battery | Test lights including turn signals | Check tire pressure |
| Inspect brakes | Inspect windshield wiper blades | Fill gasoline tank |
| Inspect fan belts | | |

| HOME CHECK LIST |
|---|
| Stop milk, paper, and other deliveries |
| Contact local police |
| Make arrangements with post office |
| Lock doors and windows |
| Disconnect electrical appliances |
| Remove food from refrigerator |
| Turn thermostat down |
| Turn off water to outside faucets |
| Arrange for care of plants and pets |
| Consider leaving house key with neighbor |

one of the biggest barriers to camping among many families—getting ready. Those who camp in recreational vehicles have a head start. Much of the equipment they will need is already waiting in the vehicle. The bigger and more self-contained the vehicle, the less advance preparation needed. Pickup coaches and motor homes can be kept stocked with staples, cooking and eating equipment. The bedding is probably there as well, and so are cleaning materials, tools, fire extinguishers, and other necessities.

Even with a detailed check list some travelers manage to forget important components of the outfit. A service station manager recalls the family that stopped to gas up the vehicle on a hot summer afternoon. It was a sizable family and a heavy load of camping equipment. When the vehicle was refueled, it rolled down the freeway.

A couple of minutes later the door of the men's room opened and out stepped the family's 10-year-old boy. An hour passed before the car came back for the boy. Once the family had made room for him they

| CHECK LIST FOR BOAT CAMPERS | | |
|---|---|---|
| **Shelter** | | |
| Tent (either to fit boat or for shore camping) | Tent fly | Windbreak canvas |
| | Ground cloth | |
| **Bedding** | | |
| Sleeping bags | Sheets or liners | Air pump |
| Pillows | Mattresses | Patching kit for air mattresses |
| **Camp Furniture** | | |
| Folding table | Folding chairs | |
| **Boat Equipment** | | |
| Fire Extinguishers | Line for docking | Boat hook |
| Flares | 100′ extra line | Bucket with line |
| First aid kit | Parts kit including shear pins and spark plugs | Canvas boat top and curtains |
| Compass | Tool kit | Navigation charts |
| Oars | Waterproof bag for papers, cameras and other valuables | Marine type compass |
| Anchor | Verry signal pistol | Hull repair kit |
| Shovel | Bilge pump | Flashlight with extra bulbs, battery |
| Axe (full sized) | Binoculars | Approved life preservers |
| **For Fun** | | |
| Fishing gear and licenses | Diving Equipment | Bathing suits |
| Binoculars | Water skis | Cameras and film |
| **Protection** | | |
| Sun glasses | Insecticides | Suntan lotion |
| Rain gear | Light weight gloves | Waterproof matches |
| Insect repellent | | |
| **Housekeeping** | | |
| Sponges | Dishpan | Icebox |
| Broom | Dish and bath towels | Bottle and can opener |
| Mop | Camp lantern | Watertight food box |
| Detergents and soaps | Camp grill | Food supplies sufficient for party for duration of trip |
| Water jug | Stove (two-burner alcohol) | Tableware |
| Paper towels | Cooking kit, nesting pans | Toilet tissue |
| Paper napkins | | |

rolled away as happily as ever—in fact, just as happy as if their check list had included each child by name.

These check lists are designed to enable campers to adapt them to their special needs. They provide a beginning which camping experience will modify and personalize. G.L.

*See also:* CAMPERS; CAMPING EQUIPMENT; HIKING; TRAILER, TENT.

# How to Camp in Foul Weather

**You can enjoy camping in any weather if you use proper gear and good planning to keep yourself warm and dry**

SOONER OR LATER, most camping families will find themselves outdoors in bad weather. Fortunately, there is an abundance of gear available for use in foul weather, which, when combined with sound planning, can make even the rainiest trip endurable.

*The most common weather threat* to family campers is rain.

More than one beginning camper has been convinced during the first rain that his new tent leaked. What gave him the idea was the fine mist that sprayed through the canvas on occupants and equipment. But usually the tent doesn't leak. This mist is normal for new canvas. The raindrops break up and are forced through the weave of the cloth until the fibers get wet and swell enough to seal them out. The only protection you need against this mist is to cover the bedding and clothes temporarily. The best plan is to first set up the new tent at home, sprinkle it, and then let it dry.

A similar problem occurs in single-wall waterproof nylon tents, but the cause is different. Moisture can condense on the inside of the tent in tiny droplets. As rain pelts the outside of the tent, the condensation inside is knocked loose. The best way to eliminate condensation is to get a double-wall tent, which uses a waterproof, coated-nylon fly over a somewhat porous uncoated nylon tent, which permits the passage of vapor. This design allows no condensation inside the tent. If you're stuck with a single-wall tent, keep it well ventilated.

Campers soon learn not to touch the inside of their tent during a rain storm. This can set up capillary action which lets water drip through the canvas. If water drips into the tent at the center pole, as it might with some older tent styles, you can cover the top of the pole with a can or a piece of aluminum foil.

Once you've had short tent stakes pull loose in wet ground you'll make enough two-foot stakes from steel pipe or rods to at least secure the corners of your tent.

Most family tents made today have sewed-in canvas floors. These add immea-

sureably to camping comfort. For extra insurance against water soaking through the floor, spread a sheet of plastic under the canvas when you pitch your tent.

It's always a good idea to take along an extra tarpaulin and a big sheet of plastic. One use for a small tarp: spread it out in front of the tent door for a foot mat. This saves tracking in a lot of leaves, litter, and sand. Use old tarp for this, or even an old throw rug which can be cleaned and dried later.

A job for another tarp is to cover the food and cooking equipment. This protects them not only from rain but also makes the campsite look neat. Tie the tarp down on the table or weight it with rocks to keep it from blowing off.

*Preparing meals* in rainy weather is sometimes a real challenge to your camping ability. Cooking inside the average sleeping tent is not a good idea, for there is a definite fire hazard and, also, the tent is likely to get smoky and greasy. In most family-sized tents there is no room for cooking, so the best answer here is a large tarp over a kitchen area outside the tent. You can buy such a fly or make it either from heavy plastic or a large piece of canvas. With this protection you can cook and eat in comfort through all but the most driving rains.

Collect and use flat-lid, watertight metal cans for such foods as sugar, salt, and flour. Equip them with waterproof labels. As added insurance for other food, keep a few plastic bags handy.

*One of the first things* a camper should look to when wet weather threatens is the family bedding. Air out sleeping bags and bedding every day when weather permits. It's often a good idea to roll up sleeping bags during the day if rain threatens. Lay them on plastic or an inflated air mattress, and cover them with plastic or a tarp if you have it available.

Most campers with floored tents no longer bother to dig ditches around their tents. They are seldom necessary, and ditching is now forbidden in many public campgrounds.

In general, when it rains, keep equipment up off the ground, whether inside or outside the tent.

These are things experienced campers do for their own wet weather comfort. But they must also look to the safety of their tents. Rain shrinks canvas, and if your tent is stretched drum-tight before a rain, the added tightening from shrinkage can pull out tent stakes. If enough of them pull out, the tent can come down around you. If stakes are too tight, the shrinking can rip your tenting at the seams.

It doesn't take a vivid imagination to realize that this is a camper's calamity, so when rain threatens, loosen the guy ropes slightly. This is seldom a problem with tents using exterior frames. Inside poles can be moved to one side at the bottom, thus releasing pressure on the tent. If you're leaving the campground for sightseeing, do this first.

*Wind,* if it grows strong, can become a hazard to your camp. Here it's better to have the tent tight and securely fastened down. Put tent flaps down and tie them, close the windows and fasten them. To keep wind from getting under the floor, pile equipment on the windward side. Fold up your camp chairs and cots.

Lightweight nylon tents are susceptible to wind damage. It's a good idea to use elastic loops (shock cords) at every stake.

If the wind is exceptionally strong it might be a good idea to take down the tent fly. A tent can usually withstand a lot of wind if it is made ready so that you keep most of the wind out of the shelter. Take another look at the kitchen area to be certain tarps and coverings are well secured. If you're close to trees that could blow down on the tent, get into the car or move into a better area.

*Starting a fire* can be difficult in wet

One convenience when camping in the snow is a camper trailer mounted on skis.

Tent and fly combination offers advantages over a single-wall tent. It prevents moisture from condensing on inside wall of tent and makes tent less vulnerable to heat or cold.

Proper rain gear can help keep bad weather from spoiling your camping trip.

Before you leave, make sure you're ready to start campfire in the rain.

weather unless you go prepared. Fire-starting tablets from sporting goods or hardware stores help. You can make excellent fire kindlers by soaking a few sheets of tightly rolled newspaper in melted paraffin, then cutting it into two-inch lengths once it has hardened. Or use an empty milk carton stuffed with other folded milk cartons.

Seasoned campers who cook over open fires often take kindling into the tent at night and cover it to keep it dry. Even if you're cooking on a gasoline stove you'll still need dry matches. Best plan is to carry a supply of kitchen matches in a screw-top metal match container. Another way to protect them is to wrap them in foil or plastic before putting them into your pocket.

Best way to dry wet shoes is to stuff them with paper and invert them on stakes far

enough from a slow burning fire to dry them *slowly*.

If you're camping primitive style, remember to cover toilet paper with a tin can.

Your camera is safe if you have it encased in a tie-shut or zippered plastic bag.

There are a surprising number of campers who get colder than they expected. There are some places, especially at high altitudes, where the days as well as nights are chilly. Whether you expect cold weather or not it's best to go prepared. Always have a sweater or jacket in the car for everyone in the family.

*Nights are the times* when you're most likely to be uncomfortable from cold. And a cold night's sleep is never fun. Sleeping bags make the warmest camp beds, but you have to strike a happy medium and not get them too heavy. It is better for summer camping to have a medium-weight bag and be able to fold an extra blanket into it on really cold nights.

An air mattress is not good insulation, because channels in it let air circulate beneath the bag. A polyurethane foam mattress is better insulation. Put some added insulation beneath the sleeping bag. Instead of placing it directly on the air mattress, spread some newspapers between them. In cold weather you need added insulation *under* you more than extra blankets over you.

You can get small heating stoves for tent use. Or you can put hot coals into a dutch oven and take it inside. Whenever you use artificial heat inside, always ventilate the tent.

There is one type of tent made especially to catch the rays of heat from a campfire and reflect them onto the sleepers. This is the Baker tent, which has an open front facing the fire. But few family campers now use this type of tent. If you do want to reflect heat into your tent (and take care with sparks if you do), set up an aluminum foil reflector behind the fire.

For some family campers heat is likely to cause discomfort, so the location of your tent is important. You may be able to find some shade. For example, the edge of a woods usually is several degrees cooler than the temperature in a nearby open field. But if you get into the woods, you may have trouble with insects and mosquitoes.

One good idea is to pitch a large fly over the tent roof to reflect some of the heat rays before they hit the shelter. Some campers even rig up a white sheet to reflect heat away from the tent. Light-colored tents reflect more heat than do dark ones, and so are cooler.

You can help guarantee yourself some hot weather comfort by taking care to choose your tent carefully. All the windows, and the door as well, should have zippered screens. Wall tents are best if they have roll-up sides for those hot days. Windows on more than one side will let a breeze through. Cottage style tents with their large screened walls, or screened tent-porch areas, can be a blessing.

*An electrical storm* has its own hazards and campers, especially, should know how to keep out of the way of lightning. Lightning tends to strike the highest object in the vicinity and travel down it to the ground. Consequently it's bad medicine to back your tent up against a high tree out in the open.

Your automobile is one of the safer places in case of lightning. A heavy electrical storm is a good reason for getting to shore quickly if you happen to be fishing, boating, or swimming.

If you must set up camp in the rain the first thing you want handy is the tent, so pack your camping gear so you can get to the tent quickly. It should be one of the last items placed on the cartop carrier or in the trunk. Then, before everything else has a chance to get wet, you can pitch the tent and have a shelter into which to move kitchen and sleeping equipment.

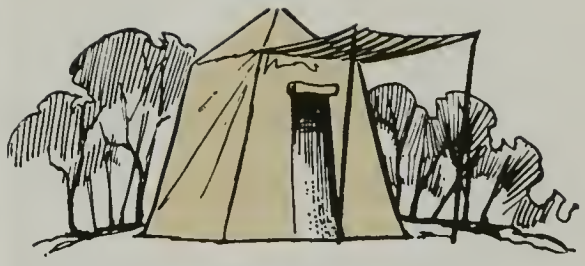
▲ *Camping in the snow is no problem, if you bring warm clothes and footwear. Snowshoes help, too.*

Pack the car so that wet tent poles and stakes are not in contact with the tent. Because canvas will mildew if it's packed away damp, you should get the tent out again and set it up at the first opportunity so it can dry. If your camping trip is over, erect the tent in the back yard.

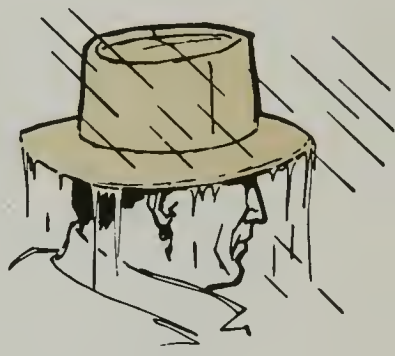
Minimizing the effects of being wet, or even better, learning what to do to avoid it in the first place, can be mastered, although it may appear dubious when the first shower sends you running for shelter.

*Take along cards, books, and games* that will make staying indoors fun. But equally important, take along raincoats, boots, and hats that keep you dry. Thus equipped, you can even get out in the bad weather, not just to check the tent and go to the store, but also to have fun. A successful camping trip grows largely from attitude. If you're well equipped and determined that no bad weather can spoil your family outing, chances are you're right.

*See also:* CAMPFIRES; CAMPING EQUIPMENT; WEATHER.



▲ *Pick your campsite carefully, preferably on top of a slight rise. Avoid nearby slopes that can release rocks or mud when wet. Also pass up dry stream beds or river banks that can overflow during a storm.*



➤ *Choose a camping hat with a brim all the way around to keep rain from running down your neck during a storm.*

▲ *Your poncho should hang to below your knee to keep water from dripping on your legs. At night, use your poncho as a ground cloth.*

# How to Read Weather Signs

**Use your eyes, your radio and a few light, simple instruments and you will be able to make reliable short-range forecasts**

*Prepare for rain, wind and lightning if a thunderhead like this heads your way. Few thunderheads appear as well defined as this one, but all usually have a large woolly cumulus base with large anvil-shaped formation at the top.*

TO A CAMPER, weather is more than a subject of conversation, inasmuch as he's a participant instead of a casual observer. On top of this, he's probably in an unfamiliar area where weather symptoms may be different from those at home. He may become alarmed at routine cloud maneuvers and not even notice the approach of severe storms.

As fine as camping equipment may be, it can seldom take the place of a well-built house and campers are a bit more vulnerable than at home.

*There are some real weather dangers.* They are lightning, hurricane, flood, avalanche, and snow-in. In nearly every case they can be avoided by weather observation, and proper camp location can often beat them.

A thermometer, barometer and a radio should take care of your weather forecasting department.

Many old-fashioned methods of weather forecasting are based on scientific fact. Others are pure superstition. Intelligent outdoorsmen soon learn to make pretty accurate short-range forecasts.

*Going into remote country,* especially in mountainous sections, your best source of weather forecasts is a radio, but inquiry about local stations is important.

First you should know just when local weather forecasts are to be given and on which broadcasting stations. Unless you've been in your chosen camping area before, you might get fooled as to just what stations you'll pick up, so find out about several. The nearest one may not be the easiest to hear. Wild and wonderful things can happen to radios in the mountains, especially the small ones used by light-traveling campers.

*A little research* will reveal that certain remote areas "make their own weather" and the nearest town may not have the most reliable forecast for your particular spot.

If you're camping in a coastal area, there is a Marine Weather Services Chart put out by the National Weather Service that will cover the section you're in. It gives location and telephone numbers of the local weather stations, and lists of the radio stations that give weather broadcasts and when such broadcasts are made.

This information covers regular broadcasting stations, radio-telephone stations,

and air navigation radio stations. The chart shows the sector of coastline covered and can be secured from weather stations.

This service is not available for inland campers. So you're on your own as to learning the time and source of broadcasts. Remember to check several stations if you're going into an area where reception may be questionable.

*It's the little homemade storms* that nail you. "Afternoon showers" can be torrents in some areas. In many parts of the country, the afternoon thundershower is routine and glossed over lightly by weather forecasters. You must be prepared for it but not be unduly alarmed by horrendous clouds which may be followed by sunshine in a few minutes.

Some of the windstorms that accompany these local rains can be severe. When using a tent, fasten it down better than seems necessary.

Forest Service personnel are not specifically designated as weather men but they have excellent radio contact and their work demands accurate weather information. In emergencies, a forest or park ranger can get you the word pretty quickly.

The barometer will be used in pretty crude fashion by weather station standards. The readings aren't as important as the trends. Sudden changes are what you must look for, especially quick drops. Don't be scared by routine daily changes.

A thermometer takes on new significance in the wilderness country. Most campers are living under different conditions, wearing different clothing and rising and going to bed at different times rather than following their back-home routines. They can be poor judges of temperature under such circumstances and may not notice the approach of a heavy freeze, so some sort of thermometer is a big help. Hang it in the shade, out of the wind and well away from a heated tent.

Left to your own devices, here are some weather forecasting aids. If observed closely, they will enable you to do a pretty good job.

Heavy dew or frost indicates fair weather and if there is none, you can look for precipitation.

Fast cloud movements mean violent air currents, even though the ground wind may not be strong. Clouds moving in opposite, or nearly opposite, directions mean turbulence—gusts and lulls in the wind.

*Density of cumulus clouds indicates rain may start falling soon. These clouds make up the "thunderheads" that warn of storms.*

▲ *Rain falling at left center was preceded by anvil-shaped cloud at right center.*

*Fluffy cumulus clouds* of the cotton batting variety indicate fair weather, but when rolled up into "thunderheads" or "anvil tops" they indicate storms. Thunderheads that approach you with dirty grey bases generally mean rain. Ragged tails at the base of such clouds mean wind.

The "line squall" is sometimes described as a line of thunderheads. At any rate, it can be violent, however brief, and is often sighted as a rapidly moving line of tumbling clouds, sometimes in a very straight line.

Wispy, elongated shreds of clouds at high altitude mean wind. They're called cirrus clouds, or "mare's tails," and can be formed into a "mackerel sky."

A ring around the moon or sun generally means precipitation. A red sky in the evening usually indicates fair weather, while a red sky in the morning generally means stormy weather.

Smoke rising straight up indicates fair weather. Smoke that flattens, smudges, or stays close to the ground indicates foul weather.

*"Fronts" mean weather changes.* Low-pressure areas cause winds to blow toward them. An east wind in middle latitudes indicates the approach of a low-pressure area from the west. When the low-pressure storm area has passed, the wind will be blowing from the west.

Rain generally begins on a falling barometer on the Pacific coast and eastern United States. In the Rockies and on their eastern slope, the rain starts when the glass begins to rise after a fall.

"Rainbow at night, sailor's delight" and "rainbow at morning, sailor take warning" are sensible observations and not superstitious nonsense.

In the United States, weather moves from west to east. In order to form a rainbow, the sun must shine on the rain. At evening, if the sun is forming a rainbow, the rainbow will be east of the viewer. That means the rain has passed and the sun is on duty again.

In the morning, when the sun forms a rainbow to the west of the viewer, it indicates that the rain is coming toward the viewer and has not yet arrived.

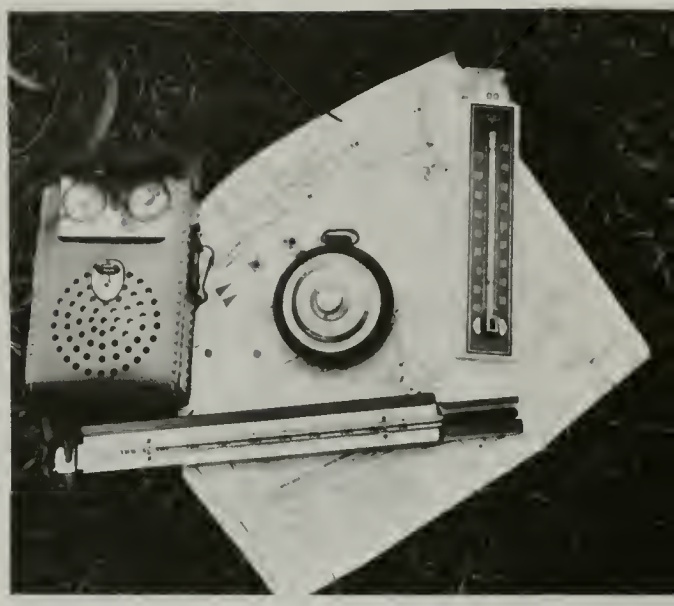
Natural error of the beginning weather watcher is to assume that since the wind is blowing from the east a storm to the west will not arrive. He does not realize that most weather moves from west to east and that the east wind is not holding back approaching weather but is actually being drawn to the low-pressure area that brings the storm.

There is little excuse for campers being caught in hurricanes. The hurricane warning system as set up now gives several days' warning. With a hurricane approaching, coastal campers should move inland.

*Tornadoes* can't be forecast as accurately as can hurricanes, but weather stations generally are able to advise when conditions are favorable to tornadoes. When a tornado alert is on, campers should keep an eye on substantial cover. Tornado violence makes short work of campgrounds.

Some camping vehicles are vulnerable to high winds. Extremely high camper bodies on pickup trucks should be parked in sheltered areas for violent windstorms. House trailers lack the stability of permanent foundations. The lesson? Don't rely on fair weather equipment. C.F.W.

*See also:* WEATHER.



▲ *Camper's weather kit should contain an ordinary transistor radio, a barometer, a thermometer, a recording thermometer and a map or chart of the area.*

◀ *Scattered cumulus clouds in an otherwise clear sky indicate fair weather for the outdoorsman.*

# Take Your Camera Camping

## Capture the golden moments of your trip on film and relive them years later

▲ *Mealtime is picture time. People are more relaxed then, less likely to stare at the camera.*

WHETHER your camping trip lasts a few days or the whole summer, you can keep the memory of it fresh forever if you record your activities with your camera.

No matter what kind of camera you have, it won't do you a bit of good without film. When you get away from home, particularly if you travel to a remote area, obtaining the size and kind of film you want can be a real headache. Don't take chances. Film is cheap, so stock up before you leave home and don't be stingy on the amount. For a ten-day trip, take along enough film to make at least 200 black-and-white exposures and still have a reserve.

Generally, figure about half this amount for color. It sounds like a lot, but you never know when you'll lose a roll in loading the camera or dropping the film in the lake.

When you get to your destination, with your camera and all that film, make use of it. You've got film to burn, so start burning it. Wherever you go, whatever you do, take your camera. And use it.

*Subject selection.* The basics of camp life are always a natural for pictures. Make shots of things like Dad cutting wood for the fire, Mom cooking or doing the dishes, the children getting water. Don't try to pose your subjects. Just let them go about what they're doing while you shoot. This way you'll get natural looking pictures that really tell the story of what you did.

Another excellent source of subject material is the small fry at meal time. What could possibly make a more memorable picture than a youngster digging into that big fried fish or pouring too much syrup on the breakfast pancakes?

Often, the food itself will make a worthwhile picture, particularly if you're shooting color.

Fishing pictures are always good, and if someone catches a big one, they are a must. Don't, however, make the common mistake of just standing back and of shooting someone dangling a limp fish in front of them.

Use your imagination. Go in close, for example, and shoot only the upper portion of the fish and the head and shoulders of your subject. Also, be careful of your background. Either shoot from a low enough angle that you get only sky behind the sub-

ject (this is particularly easy if you're in a boat) or pick a background that contrasts with the subject and isn't cluttered and distracting. Keep the center of the attention where you want it—on the subject.

*Angle and distance.* Angle is always important and often it means the difference between a nothing snapshot and an outstanding picture. Water sports and boat shots, such as of people fishing, can often be enhanced by locating a high spot along the shore and then shooting down at your subject. On boat trips along a river, a good spot to shoot from is a high bridge. On a lake, look for a cliff or high rock.

One of the basic rules for good pictures is what the pros call "filling the frame." This means getting close enough so your subject fills the picture and as much irrelevant background as possible is excluded. A tiny subject, lost in a morass of distracting background, doesn't have much impact or interest. Include only what background is important to the picture you're making. For example, a campfire shot might be made more interesting by including your tent. However, an acre of trees on either side won't add a thing unless you want a general scene; include them in the picture only to create the feeling of vastness.

Most cameras, particularly the 35s, will focus down to very short distances. Even the ones that don't can be used for very close work by adding inexpensive close-up accessory lenses. On a camping trip this opens up a whole new realm of subject matter.

Keep your eyes open for things like marine life, butterflies, wild flowers, unusual plants, and other small, but worth-

▲ *People add scale to photos. Use them wherever appropriate. Avoid placing people in dead center, and remember you're either trying for a scenery photo or a people photo. Don't try to combine the two.*

◀ *Waterfalls are good places to catch fish—and to shoot fishing photos, if you stand above the falls and shoot downward. With an adjustable camera, use several shutter-speed/f-stop combinations. One of your shots should show the water slightly blurred with motion, adding life to the photo, even if you can't see the fish.*

while subjects. For flowers and other subjects when it is hard to eliminate a distracting background, use a shallow depth of field. This merely means that by opening the lens aperture all the way and compensating for it with a faster shutter speed, you can put the unwanted background either out of, or in soft focus, while keeping your subject sharp.

Like a close-up lens, filters will add much to the versatility of your camera and should be included on a camping trip. For all around black and white use, a K-2, or light yellow filter, will add contrast and slightly darken the sky so that clouds are emphasized where they normally wouldn't even show up, and for spectacular cloud effects, try an A, or dark red, filter. Remember, when you use a filter, you have to increase the exposure accordingly.

*Lighting.* Backlighting, or shooting into the light, is another technique that is relatively simple, yet produces striking pictures. This can be done best in the morning or evening when the sun is low in the sky or, sometimes, when it is blocked by a cloud. The point is, to shoot into the *light,* but not directly into the *sun.* Early or late in the day, backlighted subjects such as boats on the water or a tent or person on the top of a hill can be shot from low angles to produce spectacular silhouettes.

Don't let bad weather or darkness put a crimp in your picture taking. If the day is gloomy, and the film you have isn't fast enough for the reduced light, calculate your exposures at double the film's rated value and shoot anyway. Mark the roll and when you get home take it to the local camera shop and ask them to process it accordingly. Drug stores won't do it, but most camera shops have a commercial lab do it, and for them it's no problem. Any added charge will be minimal.

Shooting on dark days or at night is easy if you use flash. The new flash bulbs and cubes produce plenty of light for almost anything you'll want to shoot under poor light conditions. Several dozen and a flash gun (if necessary) take up little room, so there's no problem in taking a supply along. The new compact electronic flash units are also suitable. Be sure your camera has an "X" synchronization, and take along an extra set

➤ *Use the foreground to give scale to the background. The mountain in this photo seems more massive than it would if foreground were cut out.*

*Key advice: fill the frame. Either move in close or use a telephoto lens to eliminate dead spots from photo. Also note that below-eye-level view point adds drama.*

*Photographer has reinforced ghost town theme by carefully framing the subject in the jagged outline of torn siding.*

of batteries. All you need is one nice shot of the family sitting around the campfire or the kiddies crawling into their sleeping bags to make them pay off.

However, if you're not used to them, outdoor flash shots at night do present a couple of problems. Since when camping there are no living-room walls to pick up and reflect the light, you'll have to compensate for the loss with an increase in exposure.

Usually, opening the lens up one or two stops wider than you'd set it for a similar shot inside will do the job. Decreasing the shutter speed by one or two settings will, of course, have the same effect, and with non-adjustable cameras, the compensation can be made by decreasing the normal camera-to-subject distance approximately 20%.

The other pitfall to watch out for on this type of shooting is the color of the subject. If you shoot a picture of the children around the campfire and they all are dressed in light-colored clothes, you're in good shape. The background will be black, but they will show up. However, if everyone is dressed in blue jeans and dark green shorts, the chances are the dark clothes will blend into the background and all you'll have is a picture of some faces floating in a sea of black.

Wood camp or cooking fires, by the way, register beautifully in night flash shots, so don't hesitate to shoot scenes of this type. They will be among the most memorable of your camping pictures. P.K.S.

*See also:* DARKROOMS; PHOTOGRAPHY.

# Care for the Camping Camera

**If you plan to be far from a camera store, use these tips and precautions to keep your instrument working**

THERE ARE A LOT OF THINGS that could go wrong with your camera on a camping trip. Fortunately, the manufacturers have designed most cameras rather well to minimize difficulties.

Fortunately, too, almost all camera problems can be traced back to three causes: failure to follow the instruction manual, lack of protection from the elements and dead batteries.

An example of the first type is the "jammed" camera. For some reason, you just can't snap the picture. The shutter release button refuses to budge, or if it does, nothing happens. You'll never believe how many people run into this difficulty. The reason, in many cases, is that they've forgotten to advance the film or cock the shutter. Most modern cameras have a safety interlock which prevents double-exposures; unless the film has been advanced the shutter will not operate. In cameras that have separate film advance and shutter cocking mechanisms, you must remember to cock the shutter each time you take a picture. Many electric eye (EE) cameras will not work if the battery is not in place or if the light-gathering cell is blocked (by a stray finger or neck strap). This, again, is due to a safety device built into the camera which will not allow you to take an underexposed picture.

Reading the instructions carefully when you buy a new camera, and after every time you have not used the camera for a while, will warn you in advance of most problems. It's easy to forget the details of picture taking, even with the simplest of cameras. Refreshing your memory from time to time pays off in trouble free photography.

*Protection from the elements.* Dirt and moisture are the enemies of every camera. Inside the camera, they cause extra wear and corrosion. Outside they cause good

lenses to go dull and neck straps to rot. In the extreme, dust can work its way into the shutter or diaphragm, mix with the lubricant and competely jam up or warp out of shape the most important parts of the camera.

It's easy to avoid this nightmare—just keep your camera protected at all times. The camera should always be in a case except when you're loading it with film. (Professional photographers throw their cases away, supposedly because the cases get in the way during rapid-fire shooting. Between sessions, though, you can bet the camera is put away carefully.) When you're not taking pictures, make sure that the lens cap is in place.

For more protection, wrap camera and case in a plastic bag while you're traveling. This is the most effective way of keeping road dust out of the camera. For lens protection, if your camera can use filters, add on a skylight or UV filter and leave it in front of the lens at all times. You won't notice the difference in your pictures, but the filter will protect the lens from scratches and fingerprints. Replacing the filter is easier and much cheaper than replacing the lens.

Dirt and grime on the surface of a lens won't ruin the camera, but it can ruin your pictures. You won't see dust in the corners of your pictures, you'll find instead that the pictures just aren't *sharp*. Details will be fuzzy, and you might just as well have the bottom of a soda bottle in front of your camera.

Try as you may, you can't stop dirt from settling on the lens; you have to remove it periodically. How you remove it is just as important as the act of removing it.

If you don't already have one, buy a *blower brush*. Any camera store worth its film will have one in stock. The blower brush is just a rubber bulb with a soft-bristled brush attached. With this gadget, you brush the dust from the lens and then blow it out of the nooks and crannies. Don't use anything other than a soft brush (camel's hair) or lens tissue on a camera lens. Nothing! Even the softest cloth will leave its mark on the lens.

Lens tissue will be needed to remove any grime or fingerprints from the lens. Do not use the silicone-treated papers; these will damage sensitive lens coatings.

Start your cleaning operation by loosely balling up a sheet of lens tissue. Rub the tissue gently over the lens, in circles. Start in the center of the lens and work out towards the edges. Try to soak up rather than rub off any grime. This will work better if your fingers are clean and dry of oil.

If spots persist, the use of a lens-cleaning fluid is in order. A drop or two at the most is all you'll need. Apply it with a lens tissue, in the same way you would use the tissue dry.

Moisture should be avoided whenever possible, especially salt water spray. Besides promoting corrosion in the camera, moisture is also damaging to film.

If your camera should get wet, dry it off as quickly as possible. Pay special attention to any openings or electrical connections that may be exposed. When packing a camera away, pack it in a plastic bag with a packet of silica gel. The gel will absorb any moisture present, the bag will prevent more moisture from reaching the camera.

If, by supreme stroke of bad luck, you should drop a camera into a lake or ocean, and then by supreme stroke of good luck you recover it, drastic action is needed to save the camera.

Kiss the roll of film—and all of the pictures on it—goodbye. Open the camera, discard the film, and shake out all of the water. If the camera was dunked in salt water, don't try to dry out the camera any more at this point. First, rinse out the camera in clear, clean, fresh water.

After shaking the camera fairly dry, wipe

remaining moisture with a soft cloth on the camera back and body and the lens with a lens tissue. Don't fiddle with any of the camera controls or work the shutter; you'll make matters worse. If the camera uses a battery of any kind, remove it. Then get the camera into the hands of a camera repairman as quickly as possible.

*Batteries.* Electric eye (EE) mechanisms, built-in meters, and almost all flash systems require the use of batteries. Eventually all batteries go dead or become too weak to do their job properly. Replace all "button" batteries at least once a year whether you use the camera often or not. Batteries deteriorate just by sitting around. Flash batteries go dead sooner, and should be replaced more often. How often depends on the type of battery, the type of flash system, and how much time there is between flashes. It's almost impossible to predict when a battery will go bad, so carry spares.

Batteries also corrode and leak occasionally, so check the condition of your batteries at least once a month. Don't pack a camera away for more than a few weeks without taking the batteries out first. If you find green or white residue on a battery, replace it.

A problem that crops up with cameras using flash cubes (not Type X Magicubes) is oxidation of the flash contacts, the copper tabs at the top of the camera. Depending on the condition of the battery, the oxidation will weaken the flash or prevent it altogether. To counter this problem, simply clean the flash contacts periodically with a pencil eraser. The contacts should be bright copper in appearance. Use care to make sure that they aren't bent out of shape.

One last word about batteries—get the right kind. Replace batteries with the same type or a battery listed in your instruction manual as an acceptable substitute. You may find a battery that will "fit" your camera, but if the voltage is a mere one tenth of a volt off, your exposures may be way off.

▲ *First, use blower brush to clean away all dust. Be sure to get into crevice around lens. If there are any stubborn spots, use lens tissue, crumpled into a small ball. Lightly rub in small circles, starting from the center and working towards the edge. If fingerprints or other greasy spots persist, use lens cleaning fluid with lens tissue.*

*Repairs.* If you run into trouble with your camera and can't get it to work, don't attempt to fix it yourself or force anything. The time-honored tradition of banging and kicking recalcitrant machinery doesn't work either. Take your sick camera to a repairman. He has the tools and the know-how to get the camera clicking again, and probably for less money than you think.

*Don't forget the extras.* If the camera bug has really gotten you, you probably have a bag full of accessories—cable releases, filters, lenses and the like. Fine. You should have a *sturdy* bag to carry everything in, preferably with a separate compartment for every item you carry. Lenses and filters that are free to bump around are apt to get scratched or broken. An "unbreakable" item like a cable release won't be harmed by bumps—but while loose can do damage to more delicate items that have properly been kept in place.

The inside of your camera bag should

*When the inside of your camera bag gets crowded, try this trick: tape the film cans, with bottoms together, onto the shoulder strap. Use a plastic or cloth tape for best results. If you're not using 35mm film, remember that film takes up a lot less space when you've taken it out of the box. Leave film wrapper on, though, for protection against moisture.*

*A plastic bag can be your camera's best protection against dust and rain. A tight, easy-to-undo seal is formed by twisting the bag closed, forming a loop with the end of the bag, and wrapping with a rubber band. To open the bag, just pull free end of the loop. Heavy poly bags are available from sporting goods suppliers.*

be immaculately clean. If there is a single speck of dust, you can bet your bottom dollar it's going to wind up on a camera lens or inside the shutter.

There are a few tricks to loading a camera bag that you should know. First, of course, make sure that the bag is big enough, and that it has compartments or elastic tie-down straps on the inside.

Next, take the time to experiment with different arrangements—like furniture in the living-room, the final arrangement should make good use of available space and still be convenient in use. Don't put your most-used item in the hardest-to-reach corner. If you use 35mm film, you can gain extra space by keeping the film out of the camera bag altogether. Simply tape a few cans to the camera bag shoulder straps.

Where do you put the camera bag? If you're traveling by car, don't put the camera bag (and especially not film) in the trunk, glove compartment or other hotspot. The oven-like temperatures will ruin film and can also destroy batteries and more sensitive camera mechanisms.

*There are less expensive camera bags on the market; this type is well worth the cost (about $25) in terms of roominess, convenience and sturdiness. A sheet of plastic taped to the top flap holds reference sheets; an envelope glued to the inside front holds lens tissue, note paper and an adapter ring.*

Perhaps you think this is all a lot of trouble. At first, maybe, but not after these precautions become a matter of habit. And when you don't have to worry about camera trouble, then you can make good photos a matter of habit. K.G.

*See also:* PHOTOGRAPHY.

# How to Lash Tent or Bedroll

**Do it the way this Idaho guide does it and you won't have to waste time pulling 15 or 20 feet of line through every knot each time you pack or unpack**

IF YOU'RE tired of pulling 15 or 20 feet of line through every knot as you lash your tent or bedroll for hauling, packing, or storing, then try this quick and easy, no-pull-through method of knot tying. It's done or undone in half the usual time and won't come loose if snugly tied.

To start, tie a bowline or other loop in one end of the rope. Pull enough of the rope through it to make a second loop to go around one end of the tent or bedroll as at the right of Fig. 1. Knot in the center (Fig. 1) shows how the bight of the line engages the short (4-inch) loop and holds it down against the bedroll or tent. The beginning of the knot at the left shows the lashing drawn *down* under itself. If drawn upward it will not work.

After pulling snug each turn of the rope around the tent or bedroll the extra rope is drawn back to decrease the size of the loop and a half hitch thrown over it as at left of Fig. 2. Note that the free part of the rope comes *up* through the knot. Both knot and loop have been left large enough to show detail. If either loop is reversed the ends will protrude and are easily rubbed loose in handling or carrying.

Continue on around the end of the "package" with the rope (see Fig. 3). This is the reverse side and the knots are to hold the lashings in place. Here the loop is passed *under* the lashing, brought around and under it again, leaving the line on the other side of itself (left) of Fig. 3. The beginning loop (center) will be brought around and under the line on the near side to make a similar knot (Fig. 4). All knots must be pulled tight.

The line is brought on around the other end of the package and tied in the same way beside the original knot, as in Fig. 5. The end is carried through the adjoining loop—or more if it is too long—then passed around a lashing and tied back onto itself as shown (center).

Figure 6 shows the "package" ready to go. So long as the rope is kept tight the knots will not slip. It will, in fact, hold more firmly under increased strain, yet it can be removed in less than one minute and replaced in two or three.

Incidentally, the neoprene treated cloth cover shown here, or very heavy sheet plastic (sporting goods and surplus stores) is a very worthwhile investment for keeping either of these items dry in rainy weather, or to keep these other items *from* a wet tent.

As a tent cover it need be only about 5x7 feet, but if slightly larger and fitted with grommets along one end or side it can double as an awning. Or as a side "curtain" for your tent or sports trailer awning.

As a combination groundcloth and bedroll cover it should be about 8x10 feet so its sides may be thrown over you as extra protection when sleeping in the open in cold or rainy weather.

To prepare the bedroll for travel, fold the ends over the ends of the bed, then lap the sides over the bed so all of it is tight and snug. Of course you should be sure the cap is off the air-valve, or the valve open.

**camp photography:** see photography
**campsite cooking convenience:** see outdoor cooking
**campsite cooking with foil:** see outdoor life
**camshaft:** see engine

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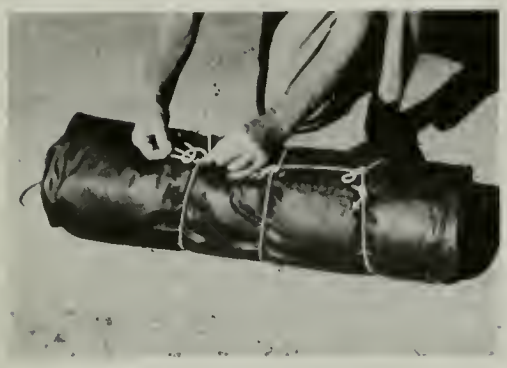


*Fig. 1.*

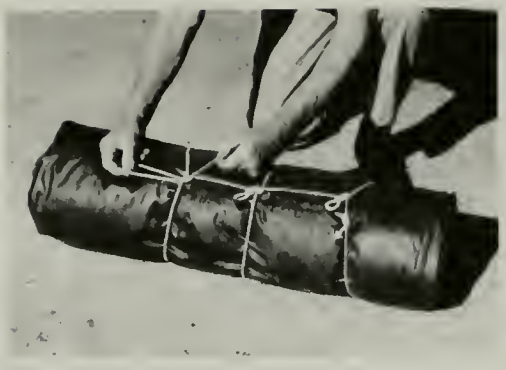


*Fig. 2.*

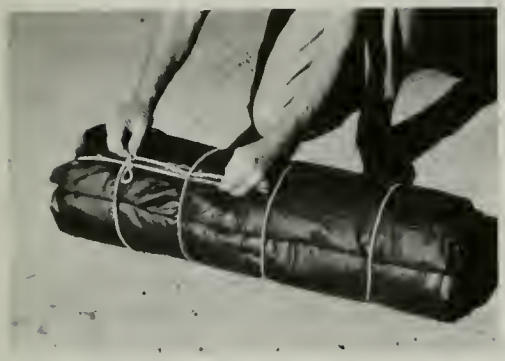


*Fig. 3.*

*Fig. 4.*

*Fig. 5.*

*Fig. 6.*

Roll the bed from the foot. Roll it tightly and slowly to let all the air escape and keep the cover snugly tucked in place.

When all the air has escaped from the mattress and the bed is nearly rolled tight replace the valve cap to prevent losing it. (Solder a small ring on it and tie it to the mattress with a short piece of strong string.) C.R.H.

*See also:* CAMPING.

# Quick-light Camp Lantern

**It only takes a moment to recycle an aluminum beverage can into an extra light**

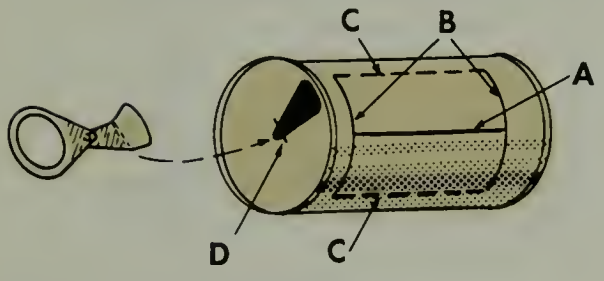
A SIMPLE CAMP LANTERN quickly and easily made from a discarded aluminum beverage can, will serve in an emergency or as an extra source of light. The inside makes a good reflector and the light will withstand a fair breeze.

Using an aluminum can, make a straight cut (A) with your jackknife starting about one half inch from the top to within about one inch from the bottom. Next, make two cuts around the can where the long cut begins and ends (B). Bend the two resulting flaps out and roll the edges back about one quarter inch for protection from the sharp edges. Melt the bottom of a candle stub and stick it to the inside bottom of the can.

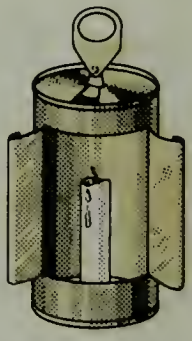
The ring on the snap-off piece provides for hanging if you bend the triangular part, as shown, and insert it into the opening, locking in place with nicks (D) made in the sides of the opening near the center of the can.

*Caution.* Do not hang this lantern within a foot of anything combustible, such as a tent wall. In addition, the area over the hanging loop can get dangerously hot.

*See also:* CAMPING.




*Cut on lines A and B, fold on dotted lines C, and you're halfway there. Roll back edges or cover them with cloth or plastic tape to make edges safe. To hang, make small cut at D and slip pop-tab into place.*



*Finished product, above, can be hung up or placed on any flat surface. It sheilds the candle from wind and rain, reflects the light and draws fewer bugs. Make several for your next trip. Plumber's candles are best for long light.*

# Preventive Maintenance for Your Gear

**There's more to getting ready for camping than checking road maps—check your equipment for a season of worry-free camping**

A pre-season tune-up and inventory of your camping equipment certainly ought to be fitted into your schedule. Stores outfit themselves early for the spring rush, so you'll find stocks large should you need replacement items. A go-over of equipment will heighten your anticipation for coming trips, too.

Starting with gear that's indigenous to both rec vehicle and tent camping, check all gas-operated lanterns, stoves, refrigerators. Items that work on fuel that's pump-pressured require a few drops of oil at the pump fitting. Tighten fuel fittings. Clean gas orifices with pins or pressure (check your instruction manuals). If you notice a faint disgusting odor you suspect might be caused by part of the codfish and peanut butter sandwich Johnny said he lost inside your rig last autumn, it could very well turn out to be escaping LP gas. Test for this by painting a soapy solution over all gas fittings. Kids' wand-bubble solution is even better than regular soap. Bubbles will form where gas is leaking. Examine the valves of LP gas tanks. Damaged valves can cause leakage. Dirt around valve pins can cause improper fit or blow dirt into gas lines. Finally, check the operation of all equipment.

Now's a good time to outfit yourself with a supply of new lantern mantles and maybe a spare generator for your stove. It's not a bad idea to supply yourself with a couple of candles and cans of Sterno just for emergencies. And what about your first aid kit? Scraped knees and elbows have a way of eating up Band-aids fast. You might need new antiseptic and aspirin.

Axes, saws, all metal equipment that has been exposed to moisture—or a good old-fashioned downpour—may have developed an unlovely patina of rust if you didn't tend to it on arriving home after your last trip. Metal gear that's stowed inside can rust just from moisture in the air. Clean as necessary, sharpen those items that need it (is there a sharpening stone in your kit?) and wipe a thin coating of grease or oil over all cutting blades. Metal campstoves, though painted, can develop rust around the burners *beneath* plates that cover fittings in some models; disassemble and check.

Duffle bags should be aired out, all rips

➤*A little baking soda in your canteens and vacuum bottles will remove "bottled-up" sour taste. Check all nuts and bolts on your rig—make sure they're tight so that you won't have loose parts rattling or falling off. Temporary patches in raingear or tents should be removed, permanent patches installed, and all seams treated with a good waterproofing compound.*

and holes mended—especially if you carry baggage on the roof of your vehicle. Without a tarp tightly encasing them, bags with rips can eventually be torn asunder by the force of whipping wind at highway speeds. Blankets and sleeping bags should be aired out, fluffed up and checked for soiling. If you have a down bag that's truly grimy take it to a cleaner who has experience handling insulated garments. Find out if he uses a cleaning fluid that's petroleum based (not the chlorinated hydrocarbon type) and don't let him treat it with water repellent unless he uses a spray method (not immersion). Down bags can be hand washed with a mild *soap* squeezed through them. For drying, hang them outdoors in a mesh hammock or bag and turn them about from time to time so the filling won't lump in one section. Only machine wash those bags that come with instructions specifying you can do so.

If you have memories of foul weather gear that had all the water repellency of a cheesecloth serape find where the leaks are; replace the garment with one of the new coated nylon or pure polyurethane suits if it is beyond repair.

Tents should be erected outdoors, preferably. (If you set up the shelter in the basement you won't be able to spray it with a hose to check for leaks.) All emergency patches of tape should be removed and holes properly repaired with fabric at this time. Tents of various fabrics require separate methods. Check with your dealer on the steps. He may very well be able to supply you with some cloth patching at little or no cost if he rents tents or works on them in his store. Sweep out the tent thoroughly. Check for any nesting insects or dead daddy longlegs stuck to sides or roof. Outside, clean off any bird droppings, berry stains. If you stowed your tent wet last season (or even between trips) you can probably expect to kiss it good-bye. A mold will have grown and destroyed the fabric fibers.

Nylon backpacker tents or flies should be retreated at the sewn seams with seam sealant, a clear, nail polish-like liquid that fills in the holes caused by needle and thread.

Do any of your poles need replacing? Too much bending and straightening can result in metal fatigue. Better have a fresh section of poling than to chance the whole shelter tottering down in the middle of a

windy, worse, rainy night. Inventory guy lines and stakes at this time, too. Check the function of all zippers (run paraffin or Chap Stik over them to lubricate) and the integrity of the mosquito netting.

Test the working of levers, cranks, hinges on all collapsible camping trailers, truck campers. Lubricate here as necessary. Special attention should be paid to the stress point on camping trailer walls made of fabric. Leveling jacks often need lubrication about now, and while you're poking around, how about that new installation for your camping trailer spare tire?

Recreational vehicles (RVs) take some additional going over, too. Tune-up here falls into two categories: those checks you can do yourself and work that you should leave to a serviceman unless you are mechanically skilled. Starting from the ground up, it is hoped that you did not store your rig outside all winter on its own tires—unless you used the unit periodically during the cold season. Tires easily develop flat spots where they are forced to support stationary weight during deep freeze conditions. These may ride out but the overall effect is a structurally weakened tire. Your rig should have been jacked up off its wheels as a minimum precaution, and for best storage, the rubber should have been hung by a rope through the rims from garage or shed ceiling.

Go over all tires now, picking stones etc. from treads, checking for weak-looking spots (bruises, chunking or cracks). Discard tires with bubbles. Have the wheels rebalanced by your local garage. Have wheel bearings on the rig checked (you may be able to do this yourself) and repacked with grease if necessary. Make sure all wheel lugs are tight but not so tight you won't be able to remove them to put on the spare should you luck out with a flat.

All hitches should be examined for signs of fatigue—especially at the joints. Ball or pintle hitches should be checked for cracks. Clean threads of all corrosion and tighten nuts and bolts. If your unit is equipped with any of the relatively new anti-sway devices, these must be adjusted per the manufacturer's instructions.

No matter what kind of unit you have, there comes a time when you should arm yourself with a set of wrenches and like a mad mechanical genius prowl around inside and out of the rig, tightening all bolts, brackets and nuts on anything you can see. Then look for things you can't see very easily. Items that come to mind as good candidates for having vibrated loose over the past season include: kitchen cabinet knobs, handles, slides; window hinges and hinged vents; auxiliary gas tanks; sewer hose connectors; bike racks; license plate holders. You'll find more.

You of course emptied all water lines and sanitary systems in self-contained rec vehicles prior to storing them in freezing weather. These items now call for complete flushing out; the sanitary system with approved cleaning compounds, not harsh detergents. Your holding tank should be examined for bad dents that later might result in embarrassing leaks. Sludge-crusted drain hoses should be replaced. Your water purifier filter should be changed also. Clean water holding tanks of mineral deposits, close all drain plugs, and if you don't expect another freeze in your area, fill the water system.

Large trailers with separate brakes need to have the electric magnets of the system checked. Brakes on the trailer should be tested for stopping performance and response.

All motorized camping vehicles and prime movers need a thorough going over. Here your mechanic's skills should be called upon. He'll give your vehicle a proper tune-up and complete lubrication including oil change, but will not have the time these days (or will charge you at an astronomical rate) to check all the smaller but still important items that need attending to according to your vehicle manual. You can do these things yourself. For example: clean corrosion from batteries and terminals and coat the contact areas with vaseline or light, clean grease. Check water level in the battery. If the battery has been sluggish, you may have to have it recharged or replaced. Tape all frayed electrical wiring with black electrician's tape. Lights that are inoperative may only need a new fuse to get them glowing again. Check your manual and uncover the fuse box. Burnt out fuses appear darker or with the filament cracked. Buy a new fuse and a couple of spares from any auto parts man. Fill the windshield washer liquid container, replace worn wiper blades. Oil door hinges. Take out floor mats and inspect for moisture and rust beneath them. Remove rust and touch up all body paint. Sweep out the vehicle, restock food in the pantry, check pressure in spare tire, check emergency road equipment including jacks.

Prior to driving in deserts or up steep mountains, make sure your cooling system is operating well. If you've experienced even slight overheating problems during flat highway driving, have your cooling system checked by an expert. There may be a slight radiator or hose leak, and probably you should have a complete reverse flush job done.

The back packer must pay chief attention to his boots. They should be treated with leather preservative. Laces frayed from past treks should be replaced. Fittings on packframes should be checked for tightness. Packaging of freeze-dried and dehydrated food should be examined since punctures can allow moisture to enter, harming the food's quality over a period of time. Worn spots on pack bags should be patched with nylon and the seams sealed.

You'll want to go over a number of small personal items as your own needs dictate, of course, but the foregoing will provide a check program that will ensure smooth camping right from season's start—not somewhere in mid-summer. J.G.

*See also:* CAMPING; CAMPERS.

# Make Your Own Sleeping Bag

**Sew-it-yourself sleeping bags offer top quality and convenience at half the price**

BUY YOUR SLEEPING BAGS in kit form and assemble them yourself. When the kit comes in the mail (complete with precut and pre-marked materials, and instructions), you stitch the sections together, assemble the zippers, fluff in the down and sew up the last seam. For a fun weekend of constructing your own bag, you save $30 to $50 and have a sleeping bag that all your neighbors will covet.

But before you lay down your coins for a bag, there are five features you'll be wise to check: shape, insulating material, versatility, fabric, and construction.

First come shapes and there are two: mummy and rectangular. Very seldom now do you find one of the older army-style mummies—the glove-tight abominations that fitted like the grip of death. The new mummies are modified with more room around the sides and especially around the feet. Today's mummies offer the best in light weight and warmth and are usually the back packer's first choice.

For those who simply *must* stretch out, a rectangular bag is the only way to sleep. Here the trade-off is between space and warmth; a larger bag has more volume to be heated (by your body heat) and more surface area to loose heat. As for weight, the difference is insignificant between a mummy and a comparable rectangular bag.

More than any other factor, a bag's quality depends on its insulating material—kapok, wool, Dacron, feathers or down. First off we can eliminate kapok and wool. Both are archaic, being so bulky and heavy in relation to warmth that they passed from the scene long ago. Next is Dacron. It's inexpensive and for equivalent weight, is about halfway between wool and down in

*To make bag, assemble inner and outer covers. Attach hood piece; draw lines to aid in sewing baffle strips.*

*Sew baffle strips on first shell. The other edge is sewn to second shell to give the "box" construction.*

warmth. The main drawback is its bulk—no matter how hard you pack Dacron, you still have a fat roll. Feathers offer a much smaller roll, and about the same warmth at double the cost.

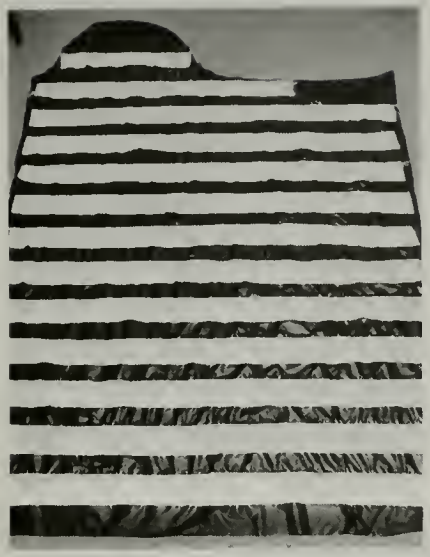
The most efficient insulator known (and the one by which all others are measured) is down—over 20 percent lighter than an equal volume of feathers. But even among down, there is the ultimate; the best quality down comes from prime northern geese (not goslings, or ducks, or geese raised in warmer climates). Don't settle for any but northern goose down. With care, a good down bag lasts for many years and pays for itself many times over. A cheap bag is misery both day and night.

Under versatility, you should decide how warm a bag you need. If you anticipate temperatures of 0° F., then invest in a bag that will keep you snug. With the wide comfort range of a heavy down bag, you can use it under blizzard conditions or, by opening the zippers for ventilation, it can serve year-round.

In zippers there are two arrangements: top and side. Side zipped bags are generally warmer and more effective than top zipped bags. A side zipper can be opened with the bag left over you; once a top zipper is opened, the sides fall away exposing your body to the night air.

And at night, if you're like most of us and appreciate company, then make sure your bag can be zipped with another for companionship. The combined warmth of two people in a double bag is substantially greater than the total of each in a single bag. Also, if you plan on pairing your bags, you might prefer to have them of varying weights—one light and one heavy. Singly you'll have a summer bag as well as a winter. Paired in cold weather, put the heavier on top; in warmer weather, have the lighter on top.

The fabric of your bag has to be tough, or else some cold, rainy night you'll wake up eating feathers. To hold up through years of camping, back packing and climbing, the fabric has to be extremely abrasion-resistant and rip-proof. Rip-stop nylon is what you want. Its sleek texture is exceptionally tough and completely downproof—you won't have any feathers come poking through your bag. Its tear strength is approximately three times that of an equal



One side of bag (shell) with baffle strips attached along their top sides. Bottom sides are sewn to other shell.

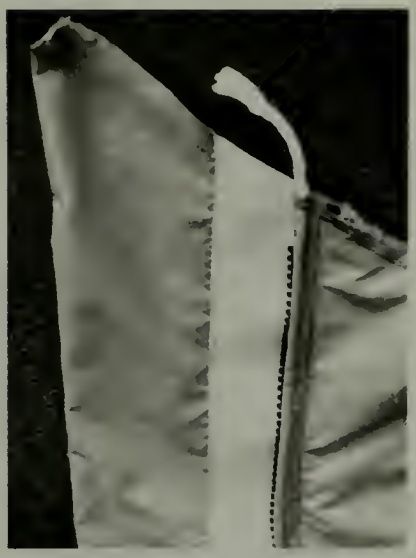
Sew baffle strips to second shell, first shell on right, second shell on left. This step attaches two shells.

Cording is being sewn into the edge of one shell, here, to act as a zipper shield in finished bag.

Top and bottom zippers zip from either end for ventilation. Also shown, interior boxes from strips and shells.

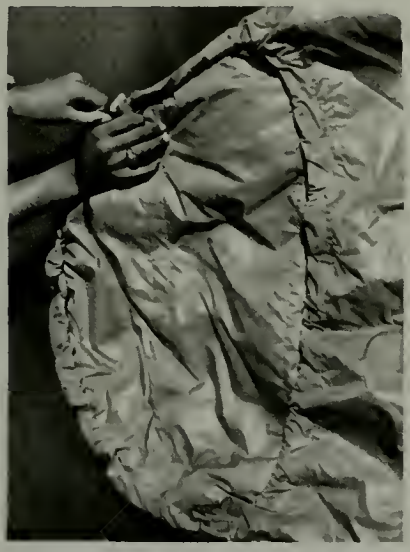
weight of fabric without the Rip-stop weave, yet it's lighter by half than any other suitable fabric. Note: Rip-stop is water-repellent, *not* waterproof; in a moisture-tight *waterproof* bag, you'll baste in your own perspiration.

Next is bag construction and here is where many people are fooled. Just because a bag contains down doesn't necessarily mean that it will be warm; nor does a heavy-weight down bag insure comfort. What can make the critical difference is



*Zipper draft-flap, attached on the inside, prevents heat loss through the zipper. Nylon tape prevents snags.*

*Each down bag is number-keyed to the corresponding compartment in sleeping bag. Two down bags go in draft-flap.*



*Down is put in the drawstring hood at bag top before sides are stuffed. This completes the work on hood.*

*Last, each down packat is inserted into correct compartment, turned inside out, with down left inside the bag.*

how the bag is put together. The three main construction types are: tubular, box and overlapping tube.

Tubular construction is where the inner cover is stitched directly to the outer in order to allow the pockets to hold the insulation. This is the simplest, least effective, and unfortunately the most common. It's cold. In a good bag, at no point should the inner and outer shells be sewn directly together; the lack of insulation along the seams insures substantial heat loss.

Box construction (where interior baffle strips are sewn to separate the inner and

*The compartment is then pinned shut, and the next one filled. With all of them sewn shut, the bag is finished!*

outer covers to create the insulation tubes) is more expensive but the increase in warmth is equivalent to adding a pound of down to a tubular bag.

The most efficient design has overlapping tubes where a third piece of fabric is sewn alternately to the inner and outer covers to create a zigzag pattern of interior pockets.

In short, be sure your bag isn't sewn through with tubular seams. And be sure the tube pockets run around the bag and not lengthwise. This way the down can't shift down to the foot-end of the bag.

At the sides, along the zipper opening, your bag should have a full-length down draft-flap to baffle the zipper. At the top, a handy feature is a drawstring hood. For warm nights, you open it flat and lay your head on it. For cold nights, you cinch it and pull the bag-top snug around your face.

Now you can decide which bag you want. But you're still squeamish about the sewing. Well, most are—until they get started. Let's sort through the process.

When your kit arrives, the only other materials you'll need are your trusty sewing machine, a zipperfoot attachment, tailor's chalk, a supply of pins, and time—figure on 10 to 12 hours. Read through the detailed directions to familiarize yourself.

Sort out the pre-cut pieces and assemble the two bag shells (one will be the inside, the other will be the outside). That done, sew the interior baffle strips. The photos with this article show the box-tube construction of one manufacturer's sleeping bag kit. Sew all the strips by one side to the first shell. Then their other side is sewn to the second shell. Thus the shells are attached only by the baffle tubes and not sewn directly to each other. Now you're half-way finished and on the home stretch.

Next, the zipper assembly. To the outside shell, hem in a white cord that will be the zipper guard. To the inside shell, attach the zipper (or zippers in this case). Now the draft-flap is assembled and sewn on, closing off that half of the bag—the down will be put in through the other side.

With the draft-flap in, we proceed to the unfinished top. Attach the drawstring casing, fill the hood compartments with down and sew shut. About the down: there's no measuring feathers; all down comes in tubular bags, number-keyed to the sleeping bag's compartments. You insert each tube into its compartment, turn it inside out, remove the empty bag and stitch the compartment shut. Invariably though, some down will adhere to its holding bag; do the filling outside for neatness.

All that's left now is filling the main body of the bag. Turn in the down, stitch the last seam, and you have your top-quality down bag for half the price. C.R.

*See also:* CAMPING.

**WHERE TO FIND IT**

Manufacturers of sleeping bag kits include Frostline Kits, Frostline Circle, Denver, Col. 80241; Eastern Mountain Sports, 1041 Commonwealth Ave., Boston, Mass. 02215; and Carikit, Box 7, Boulder, Col. 80302.

# How to Make Decorative Candles

**Large, handsome candles are not difficult to make. Once you learn how, you can create them for your own house, as gifts or for sale**

CANDLE MAKING can be a useful and enjoyable hobby, even a supplementary source of income. It's easy to learn to make decorative candles in your kitchen and the result of your work will be objects prized for both their beauty and the warm, glowing light they can shed.

The basic candle is very simple. It is a chunk of wax with a fiber wick running through it. When you light the wick, a small puddle of melted wax forms. The wick absorbs the wax and, through capillary action, carries it to the flame, where it burns. After the candle is lit, the flame keeps melting additional wax to be carried to the flame as the candle is consumed.

*All the materials and equipment* you need to make candles are either commonplace household items or are available at hobby stores at relatively little expense.

To make a simple candle, you will need a seamless melting pot, a candle making thermometer, a stove, wax color, a candle mold, mold release—it comes in an aerosol spray can—a large water bath container such as a plastic bucket, wick, cloth rag, knife and wax.

You should also keep two safety items immediately at hand: a lid for the melting pot and a container of baking soda. If the melted wax gets too hot and catches fire—it won't if you use a thermometer and never let the temperature rise above 300 degrees—place the lid on the pot and remove it from the heat. If wax spills on the stove burner and starts to flame, turn off the heat and smother the burning wax with baking soda. *Important:* see "Candle Making Safety" accompanying this article for additional information.

*To get ready to pour a candle,* first fill the water bath container with cool water. Then prepare the mold. The mold for a simple candle is a tube—its shape can be round, square, hexagonal or what have you. It is closed at one end by a flat plate with a small hole in the center. First, spray the interior of the mold with mold release, then wipe away any excess with a clean cloth. Do this thoroughly because any excess will mar the surface of the candle, and be careful not to scratch the surface of the mold.

Thread a length of wick through the hole in the base of the mold and let it drop through to the other end. Tie the free end of the wick to a metal rod—a length of

**WHEN THINGS GO WRONG**

*Candle Casting Problems*

**Leaky Mold.** Use a hot pad to hold the mold and quickly pour the wax back into the melting pot. Check the seal around the wick and the mold seams for defects.

**Candle Won't Release from the Mold.** Place the mold in the refrigerator to cause greater shrinkage. Check to see that the wick has been loosened from mold.

*Appearance Problems*

**Surface Pockmarks.** If your wax was poured too cool, it may have trapped air. If your wax was poured above 212 degrees, it developed steam that may form water bubbles. It is also possible that the excess mold release was not wiped clean from the mold.

**Layer Separation.** This usually occurs when the first layer is too cool or the second layer is not poured hot enough to bond to the first layer.

**Mottling or Small Cracks.** Slow cooling increases mottling, however, it is usually caused by too high an oil content. Liquid scents and dyes contribute to the oil content of the wax. Cooling wax too quickly can cause cracks that could be mistaken for mottling.

**Scaly Surface Areas.** This is caused by adhesion between the candle and the mold. Failure to use a mold release might be the source of your problem. A frosty appearance could also be caused by your mold being too cold at the time of pouring. Another possibility is that the wax when poured was not hot enough.

**Bubbly Lines Surround the Candle.** The level of the wax in the mold was higher than the water level when mold was placed in the water bath.

**Large Cracks in the Interior of the Candle.** This is usually due to either the well being filled after the candle has become too cool or uneven cooling. Uneven cooling can be caused by a strong draft.

*Poor Burning Characteristics*

**Smoking Candle.** The two major reasons for smoking are too large a wick or the candle is sitting in a draft. Either of these factors will cause the candle to give off unburned wax in the form of soot.

**Dripping Candle.** Too small a wick can make a candle drip because it cannot burn up the pool of wax that it creates. Too soft a wax used in making your candle will also contribute to excessive dripping.

**Leaning or Sagging Candle.** Candle was in too warm a place or perhaps was sitting in the sun. At ordinary room temperature candles should not sag or lean, but this sometimes happens if made with soft wax. Tall slender candles should not be made with wax softer than 145.

coat hanger will do. With the ends of the rod extending over the rim of the mold, pull the wick taut from the base. Secure the wick at the base with a piece of mold sealer, leaving about one inch of wick protruding. Fold the wick end over and cover the wick and mold sealer with masking tape.

*Now you are ready to melt the wax.* It comes in 5- and 11-pound slabs in a variety of melting points. In this case, and in most others, choose one with a melting point of 143-145 degrees. Break it into chunks with a screw driver or some other pointed instrument and heat the chunks in the pot to a temperature of 210 degrees. Select a wax color, scrape off shavings with a knife and add them to the melt. Melted wax does not show true color. To test, ladle a drop into cold water. The hardened drop will show the color of the melt.

**WICK CHART**

| Wax Melting Point | 128-130 | 143-145 |
|---|---|---|
| **Size of Wick** | **Size of Well** | |
| Small wire core | 2 1/2" | 2" |
| Large wire core | 3" | 2 1/2" |
| Small square braid | 3" | 2 1/2" |
| Medium square braid | 3 1/2" | 3" |
| Large square braid | 3 3/4" | 3 1/4" |

When the temperature and color are

correct, grasp the mold, using an insulated glove or a rag folded in several thicknesses, and tilt it while you pour in the melted wax. Tilting makes air bubbles less likely to form. When the mold is filled, stand it on its base and wait 45 minutes.

*At the end of the waiting period,* break the crust at the top of the wax around the wick with a knife. You will find a hollow spot that formed as the wax contracted while cooling. Fill the cavity with additional wax from the melting pot at a temperature of 210 degrees.

The candle will be ready for removal from the mold about eight hours after it was poured. Squeeze the mold to help release the wax, then release the wick from the masking tape and mold sealer at the base and tap the mold on a padded surface. Hold the mold straight up and down while tapping. If this doesn't work, place the mold in the refrigerator for 45 minutes and repeat the tapping.

*When the candle is out of the mold,* examine it for flaws, such as cracks, pock marks or unwanted mottling. If you find any, check them against the trouble-shooting table accompanying this article.

Use a cheese cutter or a knife to plane off the ridge left on the candle by the mold seam. Do this very gently. Polish the candle with a soft, dry cloth to remove all evidence of the mold line. For a higher polish, use a wet paper towel.

Now that you understand the basic candle, you can start using the wide variety of materials and techniques that are at your command.

You are not, for example, limited to straight tubular molds. Molds of plastic, rubber, clay and plaster of paris in a wide variety of shapes and sizes—animals, human figures, birds, fish, etc.—are available at hobby shops. In addition, you can improvise molds of household articles such as milk cartons, bottles, jars, molds used in cooking, muffin tins. Try using ordinary aluminum foil formed into a hollow shape with your fingers and supported in a bed of sand.

*To make a sand box,* just get a strong cardboard carton and put a plastic garbage can bag into it. Fold the upper sides of the bag down around the outside of the carton and fill the inside part of the bag that lines the carton with sand.

**SAFETY FOR CANDLE MAKERS**

Candle crafting is not dangerous if normal precautions are taken and common sense is applied. Listed below are some suggestions that should be read and remembered.

1. Keep hot wax out of reach of small children and turn handles of melting pots away from front of stove.
2. Use a thermometer whenever heating wax. Candle thermometers are available. Do not heat wax over 300 degrees.
3. Keep baking soda and lid for melting pot near stove.
4. Use hot pad or heat resistant gloves when handling hot wax.
5. NEVER LEAVE HEATING WAX UNATTENDED. When wax catches fire it is usually in the forgotten pot.

**IN CASE OF WAX FIRE**

**If fire is in the melting pot, cover with lid and remove from heat.**

**If the fire is due to wax spilled on the burner, turn heat off and sprinkle with baking soda. Do not use water to extinguish a wax fire.**

**IN CASE OF BURNS**

If hot wax is spilled on any body areas, quickly submerge the burned area in cool water to remove the heat from the wax. If the skin is badly burned, do not remove the wax. Cool the burned area and contact a physician.

## CANDLE MAKING MOLDS

**Metal Molds**—These molds give the most professional finish to the candles as they can be placed in a water bath to eliminate surface bubbles. These molds are available in traditional shapes, but you may also use Jello and cake molds.

**Plastic Molds**—Very ornate candles are possible with the use of these molds. A wide variety of shapes are available.

**Flexible Molds**—Rubber-like material used primarily for making statuary and appliques.

**Plaster Molds**—Used in the ceramic trade for casting ceramic figurines. Unlimited subjects and sizes are available at most ceramic shops.

**Clay Molds**—Made from a water-based clay available at some craft shops or at a ceramic studio.

**Sand Molds**—Made by digging a cavity in wet sand.

**Glass Molds**—Any type of glass container such as; bottles, glasses, or Christmas tree ornaments. Christmas ornaments should be cleaned out. Place sand inside and shake to remove finish on inside of ornament.

**Foil Molds**—These are simple shapes made by forming aluminum foil. Foil mold is then supported in sand.

**Decorative Concrete Blocks**—These are available at building supply stores in many different shapes.

## MATERIALS YOU WILL USE

**128/130 A.M.P. Petroleum Wax**—A low temperature wax. Do not use for tall slender candles unless they are to be foliated. Not recommended for tall candles as it might sag on a hot day.

**143/145 A.M.P. Petroleum Wax**—A medium temperature wax. This is the most commonly used wax.

**Beeswax**—A high temperature wax that is a long burning wax. This wax melts at about 150 degrees. It is used to eliminate fractures when blended with petroleum waxes.

**Wax Chunks**—Prepared from hard wax and may be used for embedding or applying to candles.

**Whipped Wax**—Wax that is whipped to fluffy consistency and applied as a decoration on candles.

**Drip Wax**—A colored plastic that has the melting and burning characteristics of wax. Used as decorative drips on candles.

**Stearine** [stearic acid]—An additive used to make wax harder and opaque. It intensifies the color. Do not use in glow candles.

**Crystalsheen**—A plastic additive that will give a lustrous sheen to the surface of the candles. When added to wax it increases the viscosity of the wax and makes it tougher. Do not use in glow candles.

**Mottling Oil**—An additive used to increase the oil content of the wax to produce a mottled or diffused effect in the coloration of the candle. Do not use with the low temperature wax. Stearine added to the wax will increase the mottling effect.

**Wax Colors**—Available in a wide range of concentrated colors that can be blended together to achieve variations.

**Wax Scent**—Used to perfume candles so they give off a pleasing odor when burned. Available in many different aromas.

**Mold Release**—A silicone spray used inside molds to act as a parting [release] agent.

**Wicking**—Available in several sizes and two types.

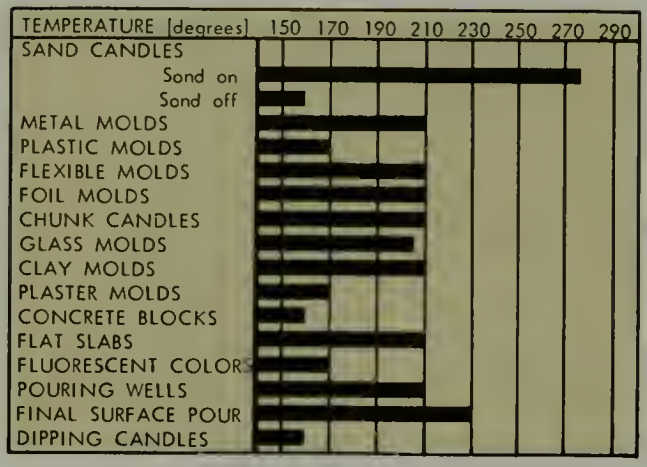
**Wick Clips**—A metal clip used to hold wicking upright.

**Gloss Spray**—A clear spray that provides a high gloss on candles. Should be applied with several light coats.

**Paper Prints**—Color paper prints used for decoupage are available in practically all craft shops.

**A.M.P.**—American Melting Point Standards.

TEMPERATURE CHART




You can use the sand to support plastic and flexible molds and to cast sand candles. In the latter method, make sure the sand is moist enough to hold a shape. Scoop the form you desire out of the sand with a spoon and pour in the wax. If you pour a relatively cool melt, little or no sand will stick to the surface. If you use a very hot melt, the candle will have an interesting rough sandy shell.

*You can also make molds* of moist clay. Get the non-firing kind. Shape it and carve it to the form you require for your candle and pour in the wax. Break the clay away after the candle hardens.

Tools you can use to achieve interesting effects include a propane torch for smoothing and removing wax, a candle pencil for attaching small applique forms or for melting on crayon colors in fine designs and a variety of gouges for carving.

With an ordinary household iron, you can embed decoupage material in the surface of a candle. Iron the cutout print or picture into the surface of the candle until it is covered by a film of wax. Clean the iron by ironing on some dry absorbent paper towels.

*You can get a wick into a candle* either before it is poured or after it has hardened. In the simple candle, the wick was threaded into the mold before pouring. If you are using an improvised mold with no wick hole in the base, tie one end of the wick to a weight, such as a bolt, and let it hang to the bottom of the mold. To insert a wick after the candle is hardened use a wick rod —a length of wire or an ice pick. Heat the rod and push it through the candle. Remove the rod and insert a wire-core wick into the hole.

*The size of the wick* determines the size of the well that will be formed when wick is burned. Different melting points of the wax also have a bearing on the size of well formed by the burning wick. The softer waxes have a bigger well than the harder or higher melting point waxes.

Select the wick to do the job that you want it to perform. If you wish your candle to foliate (spread outward), then your wick should be selected to form a well just a little smaller than the size of the candle.

The wick chart shown is to be used only as a guide as there are may variables, such as drafts, additives, bent wicks and the temperatures of the wax used. All of the above conditions affect measurements on the size well that will be formed by the burning wick.

You will find that the wire core wick will give you more consistent results as the wick burns more uniformly. Wire core wicks may be twisted together to make larger wicks. When burned, two small wire core wicks twisted together form a wick well approximately the same size as the large square braid wick.

**WHERE TO FIND IT**

There are many books on candle making available at libraries, bookstores and hobby shops. The information here is based on an instruction sheet available from U-Bild Enterprises, 15125 Saticoy St., Suite 103, P. O. Box 2383, Van Nuys, Cal. 91409.

# How to Travel by Canoe

**Tips on selecting, handling, loading and portaging a canoe, and how to use it as a shelter**

DID YOU EVER wonder why the design of the canoe has changed so little in thousands of years? There's a good reason, of course; it happens to be the best designed watercraft yet for the kind of work it is asked to do. The Indians did the world a favor.

There are some waters where the canoe is the only sensible way of traveling. This is especially true where there are alternate stretches of water and land to negotiate. The canoe and canoeist become a perfect team. The canoe carries him over water; he carries it overland.

And the 17-foot canoe can transport two men and about a half ton of equipment, all that a couple of people need for a week's hunting, fishing or camping trip through the wilderness.

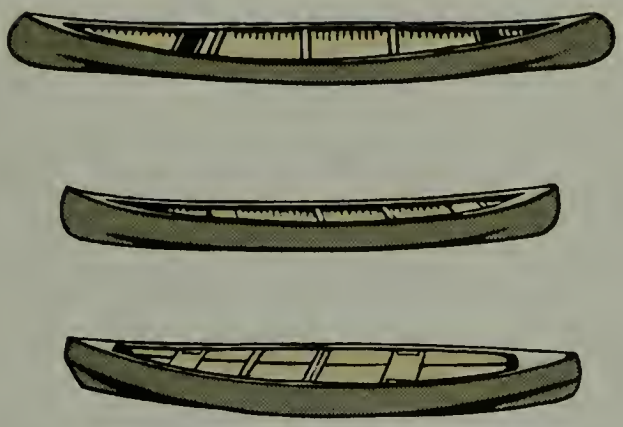
Today's canoes are made of canvas, plywood or aluminum, but mostly of aluminum. There are several reasons why this metal is excellent for canoes: it is lightweight, rugged, and long-lasting.

*Choose your canoe* by the jobs it must do. If you want a car-top canoe for one-man fishing, settle for a 13 footer. It provides plenty of room and is easily handled. If two of you will fish or hunt or camp together get a canoe that is 15 to 17 feet long, with perhaps a 36-inch beam and 14 inches deep. If you will ordinarily use a small kicker on the canoe, a square stern is the best choice. Otherwise get a standard stern and if you use a motor you can mount it on a side bracket.

A canoe is safer than many people believe it to be. Properly loaded and smartly handled, the canoe makes an excellent outfit even in fairly rough weather. There are, however, several quick ways to get into trouble with a canoe and it's good to know about them before you start.

For example, nobody but the most experienced canoeists should go out into big waters that show promise of either being

**canopy bed:** see early american
**canvas cover:** see campers



*Types of canoes and their characteristics. Guide's model (top) is the best all-around type for cruising and camping. An 18-foot model. Standard 16-foot model (center) sets low in water with two men aboard and is difficult to paddle. Aluminum prospector canoe (bottom) with 16-foot length has greater capacity than many 18-foot canoes.*

rough or getting rough. Come ashore and wait out the storm, and this applies whether or not it is an electrical storm.

Another approach to trouble in a canoe is for paddlers to trade places while on the water. If it must be done, one occupant should sit low and still in the middle of the canoe while the other one crawls across him, at the same time keeping low and steadying himself with his hands on each gunwale. But this is chancy business at best and it's asking for a dunking. Better go ashore and change places.

Some fishermen stand up in canoes and cast. They take a chance when they do. Get a little bit off balance and you're going to take a cold bath, and maybe worse. Do not stand up in the canoe.

And when you bring the canoe into the beach perform the act gently. Slow it down and ease up against the sand. Then the paddler in the bow can step out, the stern settles deeper with the weight and the canoe is easily beached.

*A good fraction of safe canoeing* hinges on loading the canoe properly. There are some rules to keep in mind when you perform this chore. And the first one, of course, is know what your canoe should carry then don't overload it.

The overloaded canoe rides too low in the water and is likely to ship water in the first mild wave. It will also be difficult to handle and turn neatly, and is especially hazardous in fast waters.

Keep the load centered and keep it low. This goes for both cargo and crew. The stern should ride a little lower in the water than the bow. You can adjust for this when you load by putting the weight a short distance back of center. The canoe should, of course, always be loaded after it is in the water and not on shore. One reason is that it helps you adjust the load for balance. The other is that it protects the craft from sharp rocks that might puncture the canoe if weight is added when there is no water.

*Canoe is ideal means of travel where journey is divided between water and land. Note how gear is stowed amidships. Well loaded canoe draws somewhat more water aft than forward.*

Put the heavy items in the center. Balance them to see that the gunwales ride level and the canoe isn't lopsided. Leave room for the passengers as you load the duffle.

In canoe country where travelers have long experience in paddling canoes and packing them across portages, they have learned the advantages of stowing everything in back packs.

Among the best packs for this are the Duluth style back packs. These are simple flat canvas bags with shoulder straps and sometimes tumplines. Without any stiff packboard they can be fitted into the canoe to fill up available space. A substitute almost as good is the regular duffle bag. The trouble with a duffle bag, of course, is the difficulty of carrying it across portages.

*In packing equipment* for canoe travel you need to take into consideration the possibility that the whole outfit might take a dunking. The more likely you are to invade rough waters, the bigger is the chance of soaking your equipment. Waterproof packs are a good idea. Gear can sometimes be partially water protected by wrapping items in plastic. Some things can be stored in small plastic bags.

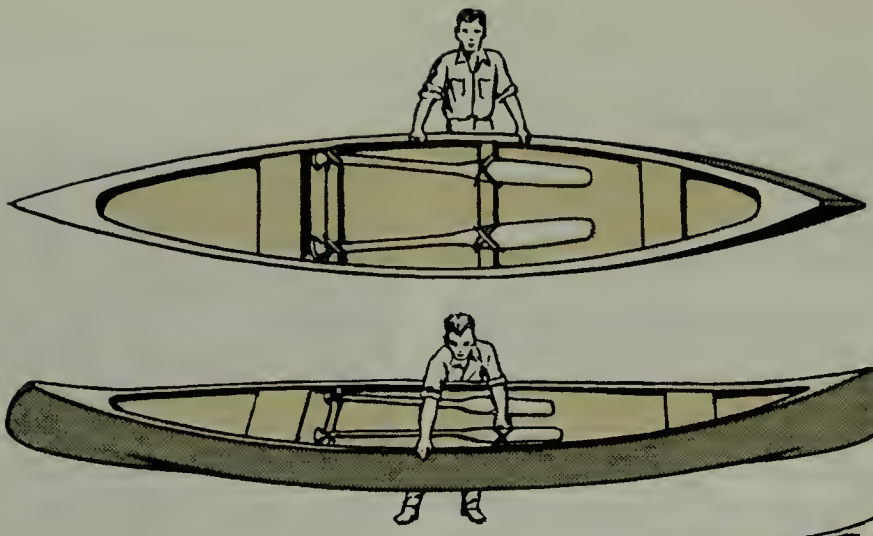
Some supply houses offer watertight rubber bags first developed by the military services during World War II.

One of these waterproof bags measures only 8 inches by 12 inches deep. In it, there is room for practically all the camera equipment, plus film you might need to keep within reach during a float or canoe trip.

Because the rubber is black it absorbs sunlight and is likely to get almost too hot to touch. This, of course, is bad for film. Paint one of these bags with a single coat of aluminum paint which helps greatly to reflect heat. As an added precaution, cover it with a sweater or some other item of clothing when it is riding in a boat or canoe.

*Don't stand up to cast unless you're prepared to risk tipping the canoe.*

*When your journey requires you to hike from one body of water to another, simply pick up the canoe and carry it.*



Proper way to lift the canoe for portaging. The secret is not to stop the upward movement. Keep it in motion up to shoulder height, then turn to take yoke across shoulders.

Drawing in stern line will drive canoe out into stream. Forward line brings it to shore.

Bow up towing is done by attaching bridle to forward thwart and running it under canoe.

*For a short portage, a light-weight canoe can be carried on one shoulder. Remember to take it easy and rest when necessary.*

One good feature of such containers is that they can be buckled to the thwarts. The best chance of recovering equipment, if the canoe should tip over, would be to have the packs tied to the canoe.

*In case a canoe should get dumped,* those who must salvage what they can of their gear may wish they had tied a few other items to the canoe. Among these would surely be rifle, ammunition and axe, especially in country where survival might require such basic items.

Some seasoned canoeists believe in lashing everything to the canoe but the paddles. The disadvantage might be that you lose the works if you really get into a bad spot. Some compromise and lash essential equipment in.

Any canoeist must consider the amount of portaging he'll have to do during the day. From a practical point of view, it gets ridiculously tedious to lash and unlash a load of equipment and packs at either end of a portage and especially if you have eight or ten portages to cross during the day.

You can, however, give some attention to making as much of the equipment as possible up into floatable packs. The sleeping bags packed together will float if water doesn't get into the pack.

Some guides would consider it a base insult if anyone suggested tying the equipment down. One who had guided for 20 years in some of the most famous canoe waters in the North Country, claimed he had never upset a canoe. One reason was that he never forgot that it could be done easily.

A large sheet of plastic will help protect the load from rain and can be used as a ground cloth at night. At any rate the weight of it is insignificant. To keep rain from collecting under duffle bags and soaking equipment, you can, before packing, lay three or four long saplings in the canoe bottom so water runs to the stern where it can be bailed

*Portaging.* One north woodsman once said, "The portages are so pretty we wish they would not be so soon over with." The short hikes gave him a chance to stretch the kinks out of his legs. He knew how to take the portages easily.

He would touch in at the trail and unload the back packs, being certain to set them on a dry spot. He needed no help to hoist the canoe onto his shoulders. It was a 17-foot aluminum canoe, an easy load for one man. And he always picked the canoe up in the same manner. He had a system and he stuck with it.

The whole operation made it look simpler than it is, until you take it a step at a time and learn the proper way of hoisting a canoe onto your own shoulders. From amidships tip the canoe onto its side with the bottom toward your knees. Using knees and hands you begin to roll the canoe upward on your knee bringing the open end toward you as you reach one hand across to grasp the far gunwale. The secret now is not to stop. Keep her moving upward to shoulder height and turn to take the yoke across your shoulders. Practice this raising motion before you are in the field, so you are physically ready.

Some guides wouldn't want anybody to see them getting under a canoe by lifting up the end of an upside-down canoe and walking their way into position under it. It may be less rhythmic than the other method but if it works better for you, use it.

*The best rule of all* for portaging is to take it easy and rest when you feel like it. Along some portage trails you find crosspoles tied between trees. You can prop your canoe up while you rest.

On the really long portages, make it in relays. Take a load part way, put it down and go back to bring another load up to the relay post. You get more frequent rests this way.

Since aluminum canoes became the most common on the waters there has been less trouble with punctures, rips and leaks. But aluminum canoes may spring a leak, and the wise traveler considers this in his planning. A little repair kit that includes marine glue and patching is good insurance. But if you have no such repairs handy, don't despair. Chewing gum will do. Chew it then push it into the hole. It can seal the small opening for quite a while. Another frequently used emergency canoe patch is adhesive tape. You may even rely on pine pitch, although it won't serve as well as adhesive tape.

Include in your equipment a pair of 75-foot ropes. Clothesline will do. Keep them coiled where they can be reached without unloading the canoe. These can be used for guiding the canoe and all of its load, except passengers, through the fast waters or the places too shallow for the whole load, providing the shoreline is of such a nature that you can walk it.

*Work out a system for your packing.* Keep food for the lunch stop where you can get to it without unpacking. Keep the axe where it can be reached. In general, reduce the number of back packs or other containers to the minimum and put all small items into large containers. This one rule, closely followed, does much to simplify work on the portages and save time. It also reduces the possibility of forgetting something or losing it along the trail. At the end of each portage count the items as they go back into their regular places.

The canoe in camp should always be pulled up on shore for the night to protect it from damage. Turn it upside down to keep moisture out of it.

There are some extra jobs it can be asked to perform in the wilderness camp. Lean it on a crosspole between two trees for partial protection when you must prepare a meal in the rain. A tarp stretched across the upturned canoe and tied out to trees or poles can make a tent fly over the cooking fire and provide a dry place for the meal. The bottom of an overturned canoe makes a handy table for food preparation or serving, just one more job for the Indians' versatile invention. M.N.

*See also:* CAMPING; HIKING; FISHING.

# Canoe Portage Rig

**One of the main advantages of a canoe is its ability to go anywhere. This rig doubles that versatility**

YOU CAN ADD greatly to your canoeing fun if you have the proper "rig" for portaging and transporting it. The features which have endeared the canoe to a new generation of voyageurs make it an ideal craft for easy transporting. Because of its light weight and shape it can be carried by hand, automobile, trailer, railway or plane. This is in keeping with the tradition of the craft in that it is ready to go whenever and wherever you wish.

One of the most popular "canoe rigs" in Canada is a modern adaptation of that used by the Indians. This modern rig was evolved by trappers and foresters and has been adopted by fishermen, hunters, and more recently by canoe enthusiasts and Boy Scout troops.

Its main appeal lies in its extreme simplicity, availability of materials, and quick and easy construction. A complete rig has actually two parts, one for portaging and one for car topping.

With the materials on hand, the average family can put the portaging rig together in the morning, and the car top outfit together in the afternoon.

*Harness materials.* The only tools and equipment required for portaging harness are one bicycle tube, four 1½ x ¼-inch bolts with nuts and washers, two ½-inch No. 8 flat head wood screws with washers, large pair of scissors, steel tape measure, marking pencil, home power drill and ¼-inch bit, adjustable wrench, and screwdriver.

The portaging rig is actually a simple harness which holds the paddles in place on the center thwart and seat so as to form a yoke for the traditional one-man carry.

*Building the harness.* The first step is to find the midpoint of the center thwart, and then mark out a center line on it. Place the two paddles with the blades resting on this center thwart, and the handles either on a seat or thwart.

When portaging the canoe you want to have the center thwart as close as possible to the back of your neck, and you will face toward the paddle handles. For best balance, the canoe should rest on your shoulders just *forward* of the balance point (which is usually just beside the center thwart) so that the canoe rises in front, allowing you to see where you are going.

Using the center point marked on the thwart, measure out to each side 22¼ inches and mark these points on the center line of the thwart. Center a washer on each of these marks and adjust the paddle

➤ *Top, completed paddle harness holds firmly, ready for portaging by the one-man carry method. Below, cartop carrier with front and rear tie-downs, plus heavy rubber-rope cross ties, holds canoe safely in place under all road conditions.*

▲ *Modifying your canoe for overland travel is a simple and inexpensive project; it can be completed in one day. First step is to locate exact center of thwart, to insure proper balance and easy carry.*

blades so they in turn are about ¼-inch outside the washers. Place the other two washers with their centers ½-inch from the outside edge of the paddle blades and mark the center point in each washer.

These center points in each washer give you the point to drill the bolt holes. Be sure to leave a space between the paddle blades and the washer to allow the blade to slip in and out after the bicycle tube has been installed. At the same time, remember that the paddle blades will rest on your shoulders to provide a carrying yoke, so you want them as close together as possible. If you have a thick neck you may need to allow more space between the paddle blades. For this reason it is a good idea to set the paddles and washers up be-

fore you do any drilling. It is also important that the paddles be at *exactly* equal distances from the center point, otherwise your canoe will be unbalanced and very difficult to carry.

When you're satisfied that the marks for the bolts are in the correct place, drill the holes. Try the bolts in them to make sure they pass through easily.

Now to the scissors and the bicycle tube. Cut the tube across about one inch from the valve and lay it along the center thwart. Allow the excess tubing to hang over one gunwale, as you will need it later.

With a nail, ice pick, or other pointed, round instrument, punch a hole through the tube at one of the inner bolt holes. Put a washer on one of the bolts, push the bolt through the tube, through the appropriate hole in the thwart, and tighten it up with the nut underneath.

Put the other inner bolt in next, but before punching the hole in the tube, stretch it slightly so it will be under tension when the bolt is in place.

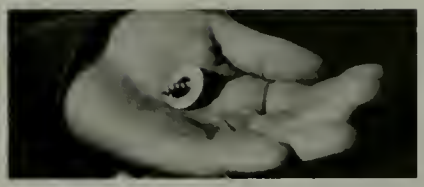
Proceed similarly with the installation of the two outside bolts. Stretch the tube so it will be under tension when installed and cut it to the proper length so you can turn under about an inch at the end. You will have four thicknesses of rubber under the washers on the outside. When complete, the paddle blades should slip easily under this rubber keeper.

*From the center point that you have marked, place paddles and washers in proper position before boring any holes. Be sure that paddle blade edges are parallel and far enough apart to rest comfortably on your shoulders.*

*After inner bolts have been tightened in position, stretch innertube slightly to keep paddle harness flat and to provide a firm grip on the paddle blades.*

*With bolt in place, innertube folded under and outer bolt hole drilled, this photo shows the amount of stretching necessary for proper tension.*

Now comes the most difficult part of the job: installing the loops that will hold the paddle handles to the seat or thwart, depending on the design of your canoe.



*There's little strain on the handle loops; only short wood screws are needed here.*

*Difficult part of job is fastening loops under seat—out of way when not in use.*

To determine the length of tube needed, loop it around one of the handles when the paddle is in position and hold the two ends up under the seat or thwart. These loops should be just long enough that they will be under tension when the paddles are in place. Cut both pieces of tubing for these loops at the same time.

Punch a hole through both ends of the loop about an inch from the end, insert one of the ½-inch wood screws with washer. The difficult part is to screw it up into the bottom of the seat or thwart. It's best to mark the spot when the paddles are in position and then start the screw with a tap of the hammer. If the seat frame or thwart is hardwood it will be necessary to drill a small hole to act as a starter hole and to avoid splitting the wood.

When installing these loops make sure the paddle handles are angled in toward each other so that the paddle blade edges are parallel to each other.

When finished, the job should look as illustrated. And with no more ado you're ready to portage your canoe in the traditional one-man carry.

The paddle harness has other uses, however. All experienced canoemen carry a spare paddle for emergencies. If there are two of you in the canoe that means a third paddle. The best place to carry it is with the blade in the harness and the handle free. Carried thus, the extra paddle is instantly available.

Keep the paddles in the harness when the canoe is not in use.

*Transporting your canoe.* For most canoeists this means car topping and this article is confined to remarks on that subject, although the same principles apply to trailering. Transportation by railway or plane is

*Finished paddle harness. Note that blades are parallel. Woolen sweater draped around neck provides ample padding for shoulders.*

*Demonstration of one-man carry. Use of tumpline is optional, not recommended for beginners because of strain on neck.*

best left to those with experience, such as the baggageman or pilot.

While a canoe can be transported on the top of a car with a blanket or other material to protect the top, it is preferable to use a roof carrier designed to carry baggage, and which locks securely in place.

The main considerations are that the canoe be fastened securely so it cannot be "sucked" off by an oncoming truck or other vehicle, that it will not be damaged en route, and that it will not come loose if emergency braking is required.

Materials and tools needed include: one car top rack, one truck tube in reasonably good condition, a 10-foot length of one-inch rubber garden hose, one large roll of plastic tape, a large roll of ¼-inch adhesive tape, a couple of feet of soft iron wire (stovepipe wire), a six-inch turnbuckle, two ring or eye-bolts ¼ x 1½ inches with lock washers, two harness snaps with swivel, 25 feet of ¼-inch cotton clothesline rope, two 8-inch lengths of ¼-inch soft iron rod, one piece of iron strip 8-x 1 x ⅜ inches, large scissors, power drill with ¼-inch metal bit, pliers with wire cutters and sharp knife.

The first step is to bend the iron rods and the metal strip. This can easily be done at home if you have a vise, but if not you can have it done at the local hardware store or plumbing shop.

The two iron rods should be bent to form an "S" shaped hook to be used for securing the rubber rope you will make to hold the canoe on the rack. The flat strip should also be bent into an "S" shape but it should be flatter than an "8" shape. It will be used to hook under the bumper and provide an anchor for a tie down rope.

*Building a canoe rack.* Now you're ready to start. Install the commercial rack and make sure it is fitted properly to your automobile. You will find it handy for future installations to identify the four corners of the rack with nail polish markings such as "LF" for left front, and so on. Roof top carriers usually have to be twisted or bent a little bit to get a perfect fit, and will only fit properly when installed the same way each time.

With the rack fitted, take it off and cut two pieces of the rubber hose long enough to fit across the top edge of the rack, front and back. Tape them in place with the plastic tape at about six-inch intervals. These will act as cushions on which the canoe gunwales will rest.

No matter what type of canoe you own, cedar strip, aluminum or fiberglass, it is important that the gunwales do not rest on the metal carrier. The continual friction and vibration when traveling can cut into the gunwales and ruin the canoe. In one case, the carrier cut right through the gunwales on a 400-mile trip.

Plastic hose may be used, but the canoe tends to slip on it more than on rubber hose.

The next step is to replace the carrier, and slide the canoe into position on it. This gives one a feeling of accomplishment and it looks as if you're making some real progress, which you are.

Take the truck tube and cut it into rings about two inches wide. Because of the tube's shape, these rings will have to be slightly pie shaped, otherwise you'll end up with some that are bigger than the first one. These rings should be two inches on the narrow side. Be careful when cutting them that you do not leave nicks along the edges where they can tear, as you're going to weave them into a rubber rope to hold the canoe in place.

Loop these rings together by putting one ring over the other and pulling the end through so you have a rubber chain, six to eight loops long. Pull the joints up tight.

Fasten one end to the carrier rack beside the canoe by putting it around the rack and pulling the loose end through. Pull it up really tight. Fasten one of the "S" hooks

made from the ¼-inch rod to the other end similarly, and toss it over the canoe. It should reach about three-quarters of the way over to the rack on the other side. Shorten or lengthen by adding or subtracting loops. Go around to the other side and stretch it carefully until you can hook it onto the carrier. Be very careful in this operation: It will take quite a pull, and if the end slips out of your hand the chances are it will conk someone on the other side, break a window of the car, or dent the side. Be similarly cautious when unhooking, holding the end until you have relieved the tension before letting go.

With these two bands in place and under proper tension you may transport your canoe safely around the lake, and for short distances on country roads. For safety's sake it is best to install tie-downs front and back, then you can take to the open road, any open road, with complete peace of mind.

It cannot be stressed too strongly that the canoe be fastened properly. There are few incidents which will ruin a trip more completely than to see your canoe leap up into the air, swirl end over end and crash into or under an on-coming car. In addition to ruining the canoe, damage to the other vehicle or injury to its passengers may be costly.

To avoid any tendency for side sway, one end of the canoe should be "Y" hitched. This is where the eye-bolts are used. Check your back bumper carefully near the bottom edge, and you may find there is already a hole on each side near where it is bolted in place. If so, place one of the eye-bolts in each hole, using a rubber washer on each side, cut from the bicycle or truck tube, and secure the nut with a lock washer.

If there are no holes, drill one on each side, about three feet apart and equidistant from the center point of the bumper. The bumper will rust around these holes, so it is best to drill them near the bottom.

With the eye-bolts in place, extend the turnbuckle to its full length and hook it to the ring or handhold at the end of the canoe. Run the rope through the eye of the turnbuckle and pull it through so that it will more than reach both eye-bolts.

Put a few turns of the soft iron wire around the doubled rope at the eye of the turnbuckle to secure it and wrap with adhesive tape. The wire will give it strength and the tape will retard rusting.

Fasten the snaps in the eye-bolts and pull the rope ends through them and have someone pull them up snug while you fasten the ends with iron wire and tape. Cut off any excess ends.

The single tie down in front has advantages in that it does not interfere with vision, and as the tie down is for emergency, the greater strength is required at the back.

For the front end, use the flattened "S" hook made from the flat iron. Pass one end of the rope through the canoe ring or handle and tie it to the "S" hook securely. Place the hook under the front bumper as close to the center point as possible, and pass the free end under the hook showing. Pull it up snug and secure with a series of half hitches. Tie down the free end, or the whipping in the wind will quickly fray the rope.

When using this rig it is preferable to tie down the front end tightly, and then tighten the turnbuckle at the back if necessary.

This rig will allow easy access either to the rear trunk or the engine without loosening the canoe in its mount.

If you wish to install an eye-bolt in the front bumper and fasten the rope to the canoe with a turnbuckle it will work equally well, and is quicker to hook up and detach, but requires that you drill another hole in the bumper.

When car-topping your canoe, the paddles will ride safely in the harness. L.M.

*See also:* CAMPING; CAR TOP.